Studies on the Agricultural and Food Sector in Transition Economies

Klodjan Rama

Too much but not enough: Issues of water management in Albania in light of climate change

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Supervisor and Reviewer:	Prof. Dr. Thomas Herzfeld
Co-Reviewer:	Assoc. Prof. Dr. Drini Imami

Leibniz-Institut für Agrarentwicklung in Transformationsökonomien (IAMO)
Theodor-Lieser-Straße 2
06120 Halle (Saale)
Tel.: 49 (345) 2928-0
Fax: 49 (345) 2928-499
e-mail: iamo@iamo.de
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Halle (Saale), 2016

SUMMARY

This study aims at analysing the major issues concerning Albania's water sector. Albania's natural conditions are characterised by abundant quantities of water resources, often too much. Yet, the demands of, especially, the agricultural sector are still not fully met.

The first issue dealt with in this study focuses on the assessment of the impacts of major institutional changes and policy reforms for sustainable water resource management enforced during the post-socialist transition period. Similar to other countries of Eastern Bloc, Albania underwent radical changes in the general institutional and legislative framework, including the water sector. One of the major policy reforms consisted in shifting the governance and management of irrigation systems from central state agencies to local water user groups, namely Water User Associations/Organisations (WUA/O). These local water user groups were assigned responsibilities for delivering irrigation water to farmers and maintain lower-level irrigation and drainage canals. Additional changes in the institutional framework concerning management and governance of water resources are expected to take place in the course of Albania's progression into the European Union. In this case, Albania is required to align its water-related legislation with the EU's Water Framework Directive.

The second major issue investigated in the study concerns the involvement of local communities in the management of irrigation systems. A particular focus is paid on analysing and understanding the determinants that may affect farmers' propensity to contribute financially or with labour in maintenance of irrigation and drainage canals. These determinants were grouped in three main categories; institutional, socio-economic and physical. The main institutional determinants identified are the land reform and the governance structure responsible for managing irrigation systems at the community level. The socio-economic determinants included the size of the community, distance to market centres and individual traits of farmers such as trust and wealth. Water scarcity measured by farmers' perception over the fulfilment of their water needs was considered a relevant determinant for capturing physical attributes of the irrigation systems.

Functioning or non-functioning of irrigation systems has an impact not only on farmers' agricultural production and, consequently, on their level of incomes, but also renders farmers more vulnerable to adverse climate-induced events such as floods, at least in the long run.

Since floods have recently become a periodic and a highly concerning phenomenon in Albania, analysing the adaptation capacities of local communities exposed to climate change effects and the possibilities of maintaining a resilient system comprises the third main issue investigated in this study.

The investigation of the above issues is guided by the Social-Ecological System (SES) framework. The SES framework is particularly designed for and has its strength in pointing to relevant variables that help to explain collective action and self-organization in natural resource management. The main theoretical inputs for explaining the impact of the identified variables on sustainable management of water resources are drawn from Theories of Institutional Change, Common-Pool Resource Theory, Resilience of Social-Ecological Systems and Adaptation Theories. Some crucial aspects of Collective Action Theory have also been highlighted.

The data are collected in 12 villages from two highly agriculturally-oriented regions of Albania and are analysed by means of qualitative and quantitative research methods. The qualitative approach is used to explore the adaptation actions and the resilience of local communities to floods as well as to analyse the institutional framework of the water sector. The quantitative approach is used to investigate the determinants that affect farmers' cooperation for canal cleaning and maintenance.

The results show that devolution policies came about and continue to be driven by imposed, top-down mechanisms with little regard to the local context. Local water user groups (WUO) established to take over the responsibility for the management of irrigation systems appeared to be simply a formal creation, existing only on paper.

The formal existence of these governance structures was confirmed also by the econometric analysis of the determinants that affect farmers' propensity to engage in collective action for canal maintenance. Results show that the governance structure – either WUO or state-run agencies – show no significant effect on financial and labour contributions. The other institutional, socio-economic and physical determinants identified as most relevant for the study are all found to play an important role on the motivation of farmers to contribute to the maintenance of irrigation systems. Land (in)equalities and land fragmentation derived from Albania's radical land reform are found to have a negative impact on farmers' contributions to maintenance of irrigation systems. The inclination of farmers to contribute more labour than financial resources is attributed to the subsistence orientation of Albania’s agriculture and the lack of scale economies. Low levels of trust, distance to market and water scarcity were also found to negatively affect farmers’ collective action prospects. On the other hand, size of the community and wealth were found to have a positive effect on collective action.

In terms of adaptation strategies that individual farmers and the community adopt in dealing with floods, the findings suggest that, while – in terms of crop diversification – the decision to plant summer crops (forage, vegetables) appeared to be influenced by a combination of different factors including climatic ones, the decision to avoid planting winter crops, especially wheat was mostly driven by climate factors. On the other hand, the other adaptation strategies at the individual household such as building houses and other farm facilities high above ground and at the community level, mainly the collective self-organisation undertaken by local people under the leadership of the community's priest were mainly driven by climate factors.

By adopting these strategies, the local community has shown concrete potentials to deal with uncertainties derived from climatic adverse impacts such as floods and therefore enhance the resilience of the respective social-ecological system.

ZUSAMMENFASSUNG

Das Ziel der Studie ist, die wichtigsten Probleme bezüglich des albanischen Wassersektors zu analysieren. Albanien ist durch ein natürliches Wasserreichtum gekennzeichnet – oft sogar durch Wasserüberschuss. Dennoch kann der Wasserbedarf, insbesondere des Agrarsektors, nicht vollständig gedeckt werden.

Der erste Teil der Arbeit behandelt die Bewertung der Auswirkungen institutioneller Veränderungen und Politikreformen auf nachhaltiges Wasserressourcen-Managements infolge der post-sozialistischen Transformation. Vergleichbar wie in anderen Ländern des Ostblocks erfolgten in Albanien einschneidende Veränderungen der allgemeinen institutionellen und gesetzlichen Rahmenbedingungen, einschließlich des Wassersektors. Eine der wichtigsten Politikreformen beinhaltete, die Verwaltung und das Management von Bewässerungssystemen von zentralen staatlichen Stellen zu lokalen Wassernutzergruppen, den Wassernutzverbänden/Organisationen (Water User Associations/Organisations (WUA/O)), zu verlagern. Diese lokalen Wassernutzergruppen waren seitdem verantwortlich für die Wasserversorgung der Landwirte sowie für die Erhaltung der Be- und Entwässerungskanäle auf der Ebene der Landwirte. Weitere Veränderungen des institutionellen Rahmens hinsichtlich der Steuerung und Verwaltung von Wasserressourcen werden voraussichtlich im Laufe des Aufnahmeprozesses in die Europäische Union erfolgen. In diesem Fall ist Albanien dazu verpflichtet, seine wasserbezogene Gesetzgebung mit der EU-Wasserrahmenrichtlinie in Einklang zu bringen.

Der zweite Teil der Arbeit beschäftigt sich mit der Einbeziehung lokaler Gemeinschaften in Bezug auf das Management der Bewässerungssysteme. Ein besonderer Schwerpunkt lag dabei auf der Analyse der Determinanten, die die Bereitschaft von Landwirten beeinflussen, sich finanziell oder mittels ihrer Arbeitskraft für die Instandhaltung von Be- und Entwässerungskanälen einzusetzen. Diese Determinanten werden in drei Hauptkategorien unterteilt: institutionell, sozioökonomisch und physisch. Die wichtigsten identifizierten institutionellen Determinanten waren die Bodenreform und die Verwaltungsstruktur für das Management von Bewässerungssystemen auf Gemeindeebene. Wichtige sozioökonomische Determinanten waren die Gemeindegröße, die Entfernung zu Marktzentren sowie individuelle Charakteristika der Landwirte (z.B. Vertrauen und Vermögen). Wasserknappheit, hier erhoben als die Zufriedenheit der Landwirte mit der Deckung ihres Wasserbedarfs, wurde als

relevanter Faktor für die Erfassung physikalischer Eigenschaften des Bewässerungssystems betrachtet.

Das Funktionieren beziehungsweise das Nichtfunktionieren von Bewässerungssystemen haben nicht nur Auswirkungen auf die landwirtschaftliche Produktion und damit auf die Höhe des landwirtschaftlichen Einkommens, sondern macht Landwirte auf lange Sicht anfälliger für negative, klimabedingte Ereignisse wie etwa Überschwemmungen. Da Hochwasser seit einiger Zeit ein periodisch wiederkehrendes Phänomen in Albanien ist, bildet die Analyse der klimatischen Anpassungskapazitäten von Kommunen sowie die Möglichkeit der Aufrechterhaltung eines belastbaren Systems den dritten Teil dieser Arbeit.

Die Untersuchung der oben genannten Fragen ist in die Struktur des Sozial-Ökologischen Systems (SES) eingebettet. Die Stärken des SES Frameworks liegen insbesondere in der Identifizierung relevanter Einflussfaktoren, die helfen können, kollektives Handeln und Selbstorganisation im Ressourcenmanagement zu erklären. Die wichtigsten theoretischen Erkenntnisse zur Erklärung der Wirkung der identifizierten Variablen auf ein nachhaltiges Wasserressourcen-Management beruhen auf den Theorien des institutionellen Wandels, der Common-Pool Ressourcentheorie, der Widerstandsfähigkeit sozial-ökologischer Systeme sowie den Adaptions-Theorien. Darüber hinaus wurden einige wichtige Aspekte der Theorie des kollektiven Handelns in dieser Arbeit hervorgehoben.

Die Daten für diese Arbeit wurden in 12 Dörfern in zwei landwirtschaftlich geprägten Regionen Albaniens erhoben und mittels qualitativer und quantitativer Forschungsmethoden analysiert. Der qualitative Ansatz wurde verwendet, um die Anpassungsmaßnahmen und die Widerstandsfähigkeit lokaler Kommunen gegen Überschwemmungen zu untersuchen. Darüber hinaus taugt dieser Ansatz zur Analyse des institutionellen Rahmens des Wassersektors. Der quantitative Ansatz wurde eingesetzt, um die Determinanten zu ermitteln, die die Landwirte im Hinblick auf die Zusammenarbeit für die Reinigung und Instandsetzung der Kanäle beeinflussen.

Die Ergebnisse zeigen, dass vor allem eine Politik der Dezentralisierung erfolgte. Diese Politik begünstigte Top-Down-Mechanismen mit wenig Rücksicht auf den lokalen Kontext. Lokale Wassernutzergruppen (Localwaterusergroups (WUO)), die eingeführt wurden, um Verantwortung für das Management von Bewässerungssystemen zu übernehmen, scheinen häufig lediglich formal auf dem Papier zu existieren.

Die formale Existenz dieser Verwaltungsstrukturen wurde in der ökonometrischen Analyse der Determinanten der Bereitschaft der Landwirte zur Beteiligung an kollektiven Maßnahmen zur Kanalinstandhaltung empirisch belegt. Die Ergebnisse zeigen, daß Verwaltungsstrukturen keinen signifikanten Einfluß auf die finanzielle Beteiligung und die Beteiligung durch die eigene Arbeitskraft ausüben – weder durch WUO noch durch staatliche Stellen. Alle anderen wichtigen institutionellen, sozioökonomischen und physikalischen Determinanten haben einen großen Einfluss auf die Motivation der Landwirte, die Instandhaltung von Bewässerungssystemen zu unterstützen. Gleichheiten beziehungsweise Ungleichheiten des Grundbesitzes und eine Fragmentierung der Flächen als Folge der weitgreifenden Bodenreformen Albaniens haben die Bereitschaft der Landwirte zur Instandhaltung von Bewässerungssystemen negativ beeinflußt. Die Bereitschaft der Landwirte, mehr Arbeitskraft als finanzielle Mittel beizutragen, wird auf die Subsistenzorientierung der albanischen Landwirtschaft und auf den Mangel an Skaleneffekten zurückgeführt. Wenig Vertrauen, die Entfernung zu Märkten sowie Wasserknappheit wurden ebenso als Faktoren identifiziert, die kollektivem Handeln von Landwirten entgegenstehen. Andererseits zeigte sich, dass die Größe der Gemeinde und Vermögen einen positiven Einfluß auf kollektives Handeln ausüben.

Im Hinblick auf Anpassungsstrategien einzelner Landwirte und Gemeinden bezüglich von Überschwemmungen deuten die Ergebnisse darauf hin, dass der vermehrte Anbau von Sommergetreide hauptsächlich durch klimatische Faktoren beeinflußt wird. Die Entscheidung Sommerkulturen (Grünfutter, Gemüse) anzubauen, gründet auf einer Kombination von verschiedenen Faktoren, von denen die klimatischen Bedingungen nur einer unter vielen ist. Andererseits werden andere Anpassungsstrategien der einzelnen Haushalte, etwa wie der Bau von Wohnhäusern und landwirtschaftlicher Gebäude auf erhöhten Fundamenten, sowie jene Anpassungsstrategien auf Gemeindeebene, durch die kollektive Selbstorganisation der lokalen Bevölkerung unter der Führung des Gemeindepriesters, hauptsächlich von klimatischen Faktoren beeinflußt.

Durch das Übernehmen dieser Strategien hat die lokale Bevölkerung konkretes Potential offenbart, mit den Unsicherheiten negativer Klimaauswirkungen wie Überschwemmungen besser umzugehen, und damit die Belastbarkeit ihrer sozial-ökologischen Systeme zu erhöhen.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ALL	Albanian Lek
APC	Agricultural Production Cooperatives
a.s.l.	Above Sea Level
CEE	Central Eastern Europe
CPR	Common Pool Resources
DB	Drainage Board
EU	European Union
FWUA	Federation of Water User Associations
FWUO	Federation of Water User Organizations
GDP	Gross Domestic Product
GS	Governance System
Ha	Hectares
HPP	Hydro-Power Plant
INSTAT	Albanian Institute of Statistics
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resource Management
Km	Kilometres
MARDWD	Ministry of Agriculture, Rural Development and Water Administration
ME	Ministry of Environment
MEI	Ministry of Energy and Industry
MTI	Ministry of Transports and Infrastructure
NGO	Non-governmental Organisation
NWC	National Water Council
RBA	River Basin Agency

RBC	River Basin Council
RBMP	River Basin Management Plan
RS	Resource System
RU	Resource Unit
SES	Social-Ecological Systems
SF	State Farms
UNFCCC	United Nations Framework Convention on Climate Change
WE	Water Enterprise
WFD	Water Framework Directive
WUA	Water User Association
WUO	Water User organization

MONETARY EQUIVALENCE

1 Euro = 140 Albanian Lek (ALL), exchange rate at the time of the fieldwork.

CHAPTER 1 – INTRODUCTION

The fall of Berlin Wall in 1989 brought about a wind of change across the countries of Central and Eastern Europe (CEE). Major transformations were witnessed likewise in the agricultural sector. Governments started giving away control over land and other natural resources, by means of legislation through privatization or by transferring rights to local governments and communities, or simply by just not being able to enforce their presence on the ground (SIKOR, STAHL, & DORONDEL, 2009; SIKOR, 2004; SWINNEN, 1999). The existing large agricultural enterprises[1] were dismantled and land ownership was either restituted to former owners or distributed among the members of these collective units (LERMAN, 2001). Irrigation systems were gradually being transferred to local government or user groups (GORTON et al., 2009; PENOV, 2004; SIKOR et al., 2009; THEESFELD, 2005). These reforms did not however go as smooth as expected. Agricultural output at the start of the reform reduced considerably (CSAKI, 2000). Farm size and land fragmentation are issues that still need to be addressed (HARTVIGSEN, 2013). Many irrigation systems fell into disrepair due to lack of maintenance and deliberate damaging, as for instance in Bulgaria (PENOV, 2004; THEESFELD, 2005).

Albania is the only CEE country that undertook a distributive land reform, i.e. distributing agricultural land on a per capita basis. This study aims to analyse whether this extreme land privatization, has certain implications for the management of bio-physical interlinked natural resources, such as water. Large collective farms were replaced with over 400 thousand small private farms of an average size of 1-1.3 ha consisting of several plots, causing in this way a high land fragmentation (CUNGU & SWINNEN, 1999; LUSHO & PAPA, 1998). Irrigation and drainage infrastructure were heavily damaged, while maintenance activities were barely performed (STAHL, 2010; WORLD BANK, 1994). Although, several efforts have been put to upgrade the systems through donors' support, the systems are still underperforming (WORLD BANK, 2010). As in many other post-socialist countries, these structures were designed for large scale agricultural systems and farms, where all decisions regarding agricultural practices and crop structures were taken by a centralized authority (THEESFELD, 2004). Also, maintenance of irrigation and drainage canals was often performed by

[1] With large agricultural enterprises are implied both, Agricultural Production Cooperatives (APC) and State Farms (SF).

agricultural cooperatives and state farms, together with water enterprises (WORLD BANK, 1994). With land privatization, the decisions where and what to plant as well as whether and how much to contribute to maintenance of irrigation and drainage canals was left to numerous individual farmers. Since irrigation systems are a typical common pool resource (CPR), their management is a challenge for any governance regime, be it state, community-based or private (MEINZEN-DICK, 2014). The current trend in management of natural resources in general and irrigation systems in particular has increasingly shifted from government agencies to local user groups. The rationale for such policies is twofold; first, there appears to be a consensus in the literature that transferring power to local communities to manage their natural resources may increase their motivation to undertake long-term investments and may vest the decision-making processes with legitimacy and accountability; and second, it reduces fiscal burden on governments (AGRAWAL & OSTROM, 2001; AGRAWAL & GIBSON, 1999; AGRAWAL & RIBOT, 1999; ARARAL, 2011; MEINZEN-DICK, 2014; SHYAMSUNDAR, ARARAL & WEERARATNE, 2005; VERMILLION, 1997).

Albania makes no exception in this regard. Irrigation systems or parts of them were transferred from 1994 and onwards to 463 Water User Associations (WUA) to serve a surface of up to 283,394 ha (around 80 % of the potentially irrigable area), or 202,442 farmer households. The process of management transfer was accompanied with the rehabilitation of the irrigation and drainage infrastructure, both processes supported by the World Bank (WORLD BANK, 2010)[2]. However, many of the established WUAs ceased functioning, leaving much of the irrigation systems unmaintained (SALLAKU, KRISTO, & BURTON, 2003). To address this issue, the Albanian government passed a new law (Law No 9860, dated 21/01/2008) on irrigation and drainage with some changes to the previous one. One of the core amendments is the transformation of Water User Associations to Water User Organizations, with a reshaped legal status, responsibilities and duties. The frequent changes in legislation have created a situation of institutional uncertainty in terms of responsibilities of various actors involved in governance of water resources. This will likely be further deepened considering Albania's EU integration aspirations, since the progression to EU integration demands institutional adjustments and higher requirements. For instance, adoption of Water Framework Directive will bring along stricter environmental regulations – for instance in water use or agricultural practices – that may incur costs to involved

[2] Rehabilitation of irrigation and drainage infrastructure and establishment of Water User Associations were supported by the World Bank, under three consecutive projects. The first project was from 1994 to 1999; the second from 2001-2004; and the third from 2005-2010. A new project has started in 2014, part of which is also the drawing of a new National Strategy for Water Resource Management based on the Integrated Water Resource Management principles.

actors, especially famers. As SIKOR (2006) argues, that may transform property from an asset into a liability.

Furthermore, additional challenges may be triggered by expected climate changes. Albania is considerably exposed to climate change as compared to other European and Central Asian countries (BAETTIG, WILD, & IMBODEN, 2007). The changes are mostly related to precipitation variations and temperature increases (MEFWA, 2009; WORLD BANK, 2011). Over recent years, several floods have occurred across Albania. They are characterised by irregular spatial patterns and temporal distributions. The most recent floods occurred in the southern part of the country in February 2015. The previous ones, with an even more destructive impacts occurred in the lowlands of northern Albania for two consecutive years during December 2009-January 2010 and December 2010-January 2011. These floods were caused by a combination of high rainfall levels and release of excess water from the hydropower stations located upstream of Drin River[3], affecting large surfaces of arable land, livestock and houses. These areas remained under water for several weeks forcing also the evacuation of many households.

1.1 OBJECTIVES OF THE STUDY

The main aim of this study is to investigate the major problems concerning Albania's water sector. The objectives of this dissertation are threefold:

1. Assess the impacts of frequent changes in the institutional and legislative framework on sustainable water governance.
2. Understand the incentives for collective action in the irrigation sector.
3. Analyse the possibilities of a resilient system and the adaptation capacities of local communities exposed to climate change effects.

Another objective is that the results of the study might be used to draw policy recommendations for addressing water problems, especially in post-socialist transition context.

Since governance of irrigation systems has formally shifted from centralized state agencies to local water user groups, it is thus important to understand whether farmers have become actively involved in management of irrigation and drainage network, especially in canal cleaning and maintenance. Non-functioning of the canals does not only affect farmers' agricultural production and, consequently, their level of incomes, but also makes them in the long run more vulnerable to adverse

[3] Drin River is the largest river in Albania where the major hydropower plants – which produce over 90 % of the country's electricity – are located.

climate-induced events such as floods. Dealing with these social dilemmas and nature-related uncertainties requires actions from different actors at multiple levels. Considering also Albania's European integration processes which require further institutional adjustments to the EU legislation, including the Water Framework Directive, the picture becomes more complex. I will now identify three main research questions to be addressed in this study.

1. What is the impact of institutional changes in Albania's water sector on sustainable water governance?
2. What determines farmers' contributions – either in form of labour or financial resources – to maintenance of irrigation and drainage canals?
3. How do local communities adapt to floods?

The investigation of the above questions will be guided by Social-Ecological System (SES) framework developed by (OSTROM, 2007, 2009). The SES framework is a diagnostic conceptual map that helps to investigate linked SESs in a more systematic and organised way. To be more specific, it may help the researcher to investigate how attributes of (i) a resource system (irrigation and drainage systems, in the case under investigation), (ii) the resource units generated by that system (water flow), (iii) the users of the system (farmers), and (iv) governance systems (WUOs and government agencies) jointly affect and are indirectly affected by interactions and resulting outcomes. It also takes into account how these attributes may be affected and affect larger socioeconomic, political and ecological settings in which they are embedded (OSTROM, 2007: 15182).

Methodologically, an embedded case study approach has been adopted, where a combination of qualitative and quantitative methods will be applied. The combination of both methods would allow to better grasp the hard-to-quantify contextual traits that would otherwise have been only thinly captured by the analysis. The qualitative approach is used to explore the adaptation actions and the resilience of local communities as well as analyse the institutional set up of the water sector. The quantitative approach is used to investigate the determinants that affect farmers' cooperation for canal cleaning and maintenance. For this purpose, a logistic regression model will be constructed. The study contributes to the literature on water management in many regards.

First, it enriches the literature on management of irrigation systems with an empirical post-socialist perspective, by taking into account the major institutional changes in agricultural land and water resources that followed the demise of the socialist system. This becomes even more relevant when considering Albania's per capita land redistribution.

Second, from the theoretical perspective, it provides a deeper understanding on collective action problems and self-organisation mechanisms of local communities by moving the analysis from a static CPR to a more dynamic and complex social-ecological system. By doing so, the study accounts for uncertainties derived from changing climatic patterns reflected in adaptation of local communities to floods and highlights the

Finally, it finds that the adoption and enforcement of integrated approaches to water resource management (IWRM and EU's WFD) is associated with a reversal of decentralisation and devolution approaches to a centralised control, although in a disguised form.

1.2 STRUCTURE OF THESIS

This thesis is organised in the following way: Chapter 2 will introduce the major changes the Albanian agriculture has undergone during the transition period, from the fall of communism until today. Section 2.1 will provide a general background on Albania's geographic characteristics in terms of land use and climatic conditions, followed by Section 2.2 highlighting some facts related to the development and problems that the sector has faced throughout the pre-transition years, and Section 2.3 providing a description and discussion of the post-socialist land reform approach and its outcomes in terms of farm size and land fragmentation. Sections 2.4 and 2.5 will describe the general water governance in Albania in terms of actors and responsibilities and the management of irrigation systems, respectively, highlighting the major problems and institutional changes.

Chapter 3 will discuss the theoretical underpinnings surrounding the issues around management of common pool resources, collective action and institutional change, as well as issues of social resilience and adaptation to adverse climate-induced events. It will start by introducing what is meant with institutions and the way they emerge, followed by an elaboration on *the voluntary, bottom-up induced* and *top-down, imposed* mechanisms of institutional change and illustrated with a brief discussion on devolution/decentralization of natural resource management. The chapter will then proceed with presenting the Theoretical Framework that will guide the analysis. The theoretical framework used in this work is the Diagnostic Framework for Analysing the Sustainability of Social-Ecological Systems (SES) proposed by ELINOR OSTROM (2007, 2009). Afterwards, the chapter will proceed with a discussion on Common-Pool Resource Theory and its implication for the management of irrigation systems in particular and other CPRs in general. Some insights from collective action theories will also be provided. This section will be followed by a discussion on the concepts of resilience and adaptation to adverse climate-induced events and their importance for human systems to deal and cope with uncertainty derived by climate changes. Finally, the main research hypotheses of the study will conclude the chapter.

Chapter 4 presents the methodological approaches used in this study, research design and empirical methods. It starts off with an introduction of the content of the chapter (Section 4.1) and proceeds with a brief discussion on the qualitative and quantitative approaches that are broadly used in social sciences, highlighting their main characteristics and their application in the current research (Section 4.2). Section 4.3 will lay out the research strategy adopted in this work providing also a description of the study areas, whereas Section 4.4 introduces the empirical methods used for collecting and organising the data, consisting of interviewing techniques such as semi-structured interviews and informal conversations, participant observation, secondary data, and data management. Finally, Section 4.5 and Section 4.6 will detail the method of data analysis which include both qualitative and quantitative analysis.

Meanwhile Chapter 5 will present the results and discuss them in connection to the theoretical background set forth in Chapter 3. It will be divided into three separate sections, which will discuss the results for each research question. Some critical reflections on the results and possible directions for future research are presented in Section 5.4.

Conclusions of the study and some policy recommendations will be summarised in Chapter 6. Annexes containing regression results and different robustness test, STATA codes and the household questionnaires will wrap up the document.

CHAPTER 2 – ALBANIA'S AGRICULTURAL SECTOR UNDER CHANGE

This chapter will provide a description of the development of Albania's agricultural sector. It will begin with a general background view on main land use patterns and climate characteristics of Albania, and then proceeds with a description of the key developments of the agricultural sector from the communist period until today. Finally, it will discuss the most important issues concerning the governance of the water sector and evolving institutional arrangements.

2.1 BACKGROUND

Albania is a small country with a population of about 3 million inhabitants located in South East Europe covering a surface area of 28,748 square km. It borders with Greece to the south, Former Yugoslav Republic of Macedonia to the east, Kosovo and Montenegro to the north and Adriatic and Ionian Seas to the west. The terrain is mostly hilly and mountainous in more than 70 % of the surface. Albania's agriculture resource base is very limited, with only 0.2 ha of arable land per capita (the lowest in Europe). The country's arable land is about 25 % (some 700,000 ha). An additional 15 % or 425,000 ha is pasture land, while another 1,050,000 ha is forest land. The country is typically divided into three geographical zones: (a) the coastal plains with about 44 % of the arable land; (b) the hilly or foothill areas with 37 % of the arable land; and (c) the mountainous areas with 19 % of arable land. The coastal plain is the most fertile area and regarded as having the most agricultural potential (MAFCP, 2012).

In terms of climatic conditions, Albania has a Mediterranean and continental influence with mild winters characterised by abundant rainfall and hot dry summers. Spatial and temporal distribution of rainfall and temperature has large variations across the country. The north receives up to 3000 mm while the plain area between 600-1000 mm, with about 70 % of the total rainfall occurring during the cold months from October to March (BRUCI, MUÇAJ, & NDINI, 2008; MEFWA, 2009; WORLD BANK, 2009). These variations may be even further exacerbated by changing climatic patterns, given that Albania is considerably exposed to climate change (BAETTIG et al., 2007; MEFWA, 2009; WORLD BANK, 2011). Based on climate change scenarios for 2025, 2050 and 2100 prepared by the Ministry of Environment, Forests and Water Administration for its Second Communication to the Conference of Parties under the UNFCC (2009), there is predicted an increase in annual temperature of 1.0, 2.0 and 4.1°C, and a decrease in annual precipitation of up to 3.0 %, 6.1 % and 12.4 % by 2025, 2050 and 2100, respectively.

This in turn is expected to affect water levels and river flows. The most pronounced impacts from these changes will be faced by the agriculture and energy sectors (MEFWA, 2009; SUTTON, SRIVASTAVA, & NEWMAN, 2013). The energy sector is highly sensitive to climate variations given that over 90 % of the total energy production of the country is generated by hydropower plants (HPPs) (MEFWA, 2009). Likewise, agriculture still remains one of the most important sectors of the economy, since it provides official employment and livelihoods for half of the country's population (MAFCP, 2012; WORLD BANK, 2011). During the first years of transition from centralized to free market economy, the agricultural production declined by 25 % and since then it has witnessed only positive growth, although its share to the total economic output has been reduced from more than 50 % in the 1990s to 17 % in 2012 (KODDERITZSCH, 1999; MAFCP, 2012; WORLD BANK, 2007).

2.2 PRE-1990 DEVELOPMENT OF ALBANIA'S AGRICULTURE

Until 1990, Albania was the most politically-isolated and the poorest country in Europe. Similar to other communist countries of the Eastern Bloc, its economic philosophy was based on central planning, whereas the isolative approach that the communist government had taken towards the outside world, made self-sufficiency to be the cornerstone of economic policies (WORLD BANK, 1994). During the early years of communist regime, a wave of investments and radical reforms were undertaken in all sectors of the economy. Agriculture sector underwent the deepest transformation, especially in land ownership and organizational structures. In 1945, the communist government initiated an agrarian reform whose primary goals were the expropriation of large landowners and redistribution of their land to landless farmers, who could nevertheless not enjoy the newly acquired land for long, as redistribution was soon followed by collectivization of agricultural land.

Collectivization started in the 1950s and was completed in 1959 in south-western Albania and in 1967 in the remaining mountainous areas (FISHTA & TOÇI, 1984). This process led to the creation of about 500 large agricultural production cooperatives (APC) and about 150 state farms (SF) (INSTAT, 1991). The average size of agricultural production cooperatives was about 1300 ha. APCs occupied around 70 % of the arable land and provided about 50 % of the total agricultural production. Meanwhile the average size of SFs was 1100 ha ranging from 500 up to 2000 ha cultivating around 20 % of the total arable land and providing about 30 % of agricultural production (CUNGU & SWINNEN, 1997; SEGRÈ et al., 1999). Table 2-1 shows structural changes in land ownership from 1950 to 1990. Investments consisted mainly in mechanization, infrastructure, land reclamation, terracing and construction of large irrigation and drainage networks.

Table 2-1: Albanian land ownership by area during the period 1950-1990

Year	1950	1960	1970	1980	1990
State farms	13, 000	65,000	124,000	151,000	170,000
Cooperatives	21, 000	330,000	454,000	532,000	504,000
Households home plots	357,000	62,000	21,000	19,000	30,000

Source: INSTAT, 1991.

Note: The figures are in hectares (ha).

However, despite the reforms and investments to modernize the agricultural sector, it still struggled to meet the food demands of the population (SEGRÈ et al., 1999; WORLD BANK, 1994). In 1986, agricultural sector contributed about 50 % to the GDP, although its contribution fell to 33 % in the end of 1980s and beginning of 1990s, causing a drastic decrease in agricultural output and food shortages (CUNGU & SWINNEN, 1997).

In Albania, as in the rest of Eastern Europe, the 1980s were a period of economic stagnation. The annual output growth that had been in the 10 % range in the 1950s went below 1 % over the decade (WORLD BANK, 1994). This reflected not only lower levels of investment[4], but also a marked slow-down in productivity growth. A major drought in 1990 exacerbated the already difficult situation. Agriculture was directly affected, resulting in net imports of food stuff where Albania was once a net exporter of food, and in the cessation of exports of electricity. It is estimated that GDP fell by 10 percent in 1990, mostly as a result of the drought (WORLD BANK, 1994).

2.3 LAND REFORM 1991: THE DISTRIBUTION APPROACH

Alike other countries of the former Eastern Bloc, Albania also underwent deep political, economic and social changes after the fall of the communist system in 1991, with land reform being one of the most important. While most former socialist countries restituted the land to former owners, Albania opted for a distribution approach, dividing the land previously held by agricultural production cooperatives and state farms to their members on egalitarian basis, i.e. every recipient received the same quantity of agricultural land conditional on land quality and other indicators of land value (LEMEL, 2000a; LERMAN, 2001; STANFIELD & KUKELI, 1995). Being the poorest country in Europe and with the majority of the

[4] Albania, as result of its isolative approach, could not get foreign aid after breaking relations with its two biggest allies, Soviet Union in 1961 and China in 1978.

population living in rural areas, this distributional approach[5] was considered a solution to cope with economic collapse (SWINNEN, 1999). The eligibility of the farmers to receive land depended on the condition that rural families that were members of these collective organizations should reside on the village at the time of distribution[6] (CUNGU & SWINNEN, 1999; LEMEL, 1998).

According to the Law on Land, known as the Law 7501 (dated 19.07.1991), the land was to be distributed to ex-cooperative and ex-state farm members for free. Nearly 400,000 rural families received land from the former cooperatives land fund, which amounted to over 500,000 ha, and at the same, over 100,000 ex-state farm members received land from over 150,000 ha of the ex-state farms' land fund (CUNGU & SWINNEN, 1997).

Despite its equity considerations, the implementation of the reform underwent several challenges. Ex-owners strongly contested the official approach and in many cases, especially in the mountainous areas, they even reasserted their ancestral claims, disregarding the formal law stipulations (LEMEL, 2000a; DE WAAL, 2004). Although the government reacted by enforcing two subsequent laws in 1993 and 1995 to recognize these local specificities and compensate ex-owners with either financial means or land in touristic coastal areas, a situation of tenure insecurity emerged (LEMEL, 2000b). That had implications also for the establishment of land market, which is still informal and distorted (DEININGER, SAVASTANO, & CARLETTO, 2012; WORLD BANK, 2006).

In terms of land reform outcomes, the most visible one is the sharp land fragmentation. It resulted in creation of over 400,000 family farms owning about 1.9 million separate parcels. The farm size is pretty small, of an average size of 1-1.2 ha, and consisting of three to five plots of land per family, all dispersed across the village (LEMEL & DUBALI, 2000; LUSHO & PAPA, 1998)[7].

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5 SWINNEN (1997) defined three options for consideration: (i) the Minimal Reform Option, which implies more autonomy for enterprises but with only minimal restructuring and limited privatization of assets; (ii) the Social Equity Option, meaning the full distribution of property rights to farm workers and rural households; and (iii) the Historical Justice Option, meaning the full restitution of property rights to former owners.

6 The part of the population resident in the village but not working in a cooperative were awarded half of the land per capita given to the rest of the population with an upper limit of 0,1 ha (law 7501, Art.6). Later on, this part of the population was also compensated with state land or refused land, whenever it was available in the area of the village. The same de jure benefits were given to unemployed families and those who possessed the status of politically persecuted by the Communist regime (Law 7514, date 30.09.1991) (MEÇANI, 2009).

7 The farm size varied with the geographical characteristics of the country. The average farm size in lowlands is 1.3 ha while in the mountain areas averages to 0.8 ha (CUNGU and SWINNEN, 1999; LEMEL and DUBALI, 2000).

Table 2-2: Area planted with arable crops

Crop	1993	1994	1995	2009	2010	2011	2012
Wheat	155	170	141	82.8	73.9	69.2	73.2
Maize	73	75	69	47.6	54.2	61.2	53.5
Rye	2	2	3	1.1	1.1	1.5	1.3
Barley	3	4	3	1.7	2.5	2.8	2.4
Forage	162	156	135	200	202	204	208.9
Vegetables*	32	34	39	30.3	30.8	30.6	31
Potatoes	10	11	12	9.1	9.0	9.5	9.3
Beans	20	19	22	14	13.7	14.4	14.6
Tobacco	13	6	6	1.2	1.2	1.2	1.3
Sunflower	2	1	1.2	1.2	1.3	1.5	1.4
Soybeans	1	0.2	0.1	0.3	0.3	0.3	0.3
Other	17.3	12	20.9	13	14	12.8	12.6
Total planted area	490.3	490.2	452.2	402.3	404	409	409.8

Source: MINISTRY OF AGRICULTURE, FOOD AND CONSUMER PROTECTION (2012).

Note: * The area indicating vegetables includes also watermelon; Figures are in thousand hectares (ha).

The newly created farm structures determined also agriculture practices. Having numerous scattered plots, farmers tended to diversify their cropping patterns. In the early years, right after the reform, wheat and maize still dominated the crop structure, followed by forages and vegetables, which were mostly used to cover subsistence needs (KODDERITZSCH, 1999). The current crop structure, as shown in Table 2-2, is not much different from before, but the land surface planted with wheat and maize has been reduced, balanced by an increase in forages (MAFCP, 2012). The same trend is observed in agricultural output. With farms performing below potential levels, large part of the blame has gone to the small farm size and fragmentized farm structure for not allowing economies of scale as well as to the downgraded irrigation and drainage infrastructure (WORLD BANK, 2006). These two issues go hand in hand given that irrigation and drainage infrastructure was projected for a large-scale agriculture, therefore, its operation and maintenance requires the involvement of a larger number of actors, as well as fundamental changes in the institutional set up that reflect the new reality in the agricultural sector. It is this that I am going to discuss in the following sub-section.

2.4 WATER GOVERNANCE IN ALBANIA

Albania may be considered as a rich country in terms of water resources. For water management reasons and to comply with EU's Water Framework Directive, Albania's water resources have been divided into six river basins (Drin Bunë, Mat, Ishëm-Erzen, Shkumbin, Seman and Vjosë) and part of their basins' surface is situated outside of the state borders of Albania (Montenegro, Macedonia, Kosovo and Greece). The seven main rivers cross the territory of the country from the east to west (Drin, Mat, Ishëm, Erzen, Shkumbin, Seman, Vjosë). The total annual rate of flow is 39.22 billion m^3/year, where 95 % is discharged into the Adriatic Sea and only 5 % into the Ionian Sea. Two characteristic periods are distinguished regarding to the water flow rate, the humid period (October-May) with 86 % of the annual flow rate, and the dry period (July-September), covering the remaining part of the annual flow rate.

The lakes cover 4 % of the territory, including three large lakes and 247 small lakes. A number of 626 reservoirs, with an accumulating capacity designed to be around 5.6 billion m^3, are constructed along the rivers and streams and are used for irrigation, protection against flooding and production of the electrical power. The ground waters are also plentiful and contribute by 23 % to the annual total flow. They are distributed along the entire territory and are utilized by natural outlets and wells, serving mainly as potable water for around 80 % of the towns. A small quantity is used for irrigation, mainly in the western lowland (MUKAJ, 2013). Currently, the largest user of water resources is the energy sector with 14 billion m^3, followed by agriculture with 1.01 billion m^3, whereas 0.22 billion m^3 is used by industry and for drinking water (MEFWA, 2009).

The governance of water resources is rather complex. It is characterised by a high degree of centralization and involvement of several actors at different levels. The main authority is the National Water Council (NWC), composed of different ministers and chaired by the Prime Minister. The key responsibilities of NWC consist in defining the main policies and strategies and approval of legislation concerning water management at the national level. The technical part and institutional aspects of water management are covered by the Technical Secretariat of the National Water Council. The Secretariat proposes strategies and action plans for water management at the national and international level to be then approved by the NWC; monitors the implementation of action plans and national water strategy, and; monitors the work of River Basin Councils (RBC) and River Basin Agencies (RBA) (Law 111/2012). RBCs are regional level councils responsible for integrated water resource management within the respective river basin. Its duties consist in fair water allocation to water users, protection of water resources from pollution and identification of water bodies that need protection. Meanwhile, RBAs serve as technical secretariats for RBCs with the duty to foresee the situation on the ground.

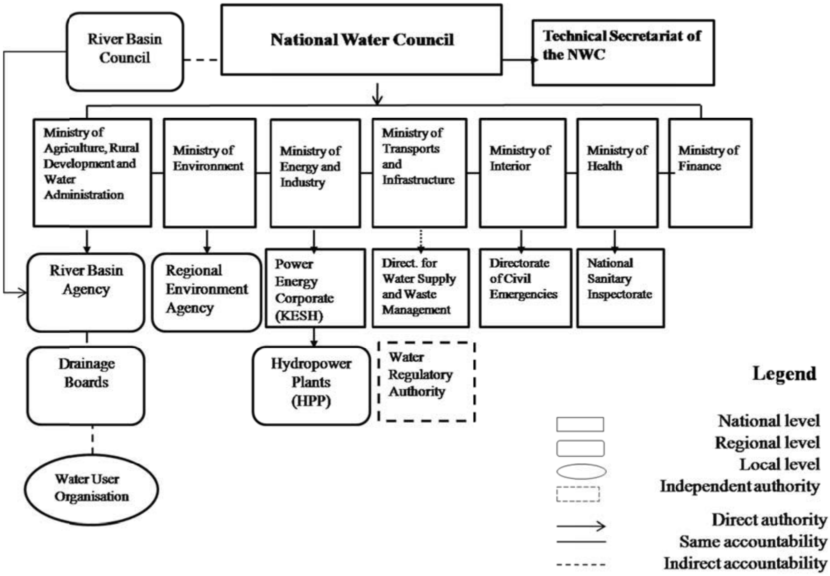
The main law that regulate the governance of water resources is Law No. 111/2012 dated 15.12.2012 on "Integrated Water Resource Management", whose main stated objectives are to protect and sustainably use water resources as well as to define the institutional framework for the implementation of national policies. The institutional framework for managing water resources is nevertheless constantly changing given that Albania has been granted the candidate status to join the European Union (EU) in 2014. That means that Albania has to transpose its legislation to EU's Acquis Communautaire, which in the case water resources, to Water Framework Directive (WFD) (Directive/2000/60/EC) and other water-related frameworks[8]. Also, political rotations are accompanied with changes in responsibilities of the involved actors, especially at the higher level. For instance, the Technical Secretariat was formerly the General Directorate of Water Administration, under the responsibility of the Ministry of Environment, but since January 2014, it is attached to the Prime Minister's office. Often that may create overlapping and/or fragmentation of responsibilities and strategies between the actors. For instance, while the Ministry of Environment is responsible for drafting, proposing and implementing policies, strategies and action plans for environmental protection and administration of water resources, the management of irrigation and drainage systems is responsibility of the Ministry of Agriculture, Rural Development and Water Administration and its agencies at the local level, namely Drainage Boards, as well as participatory water user groups such as Water User Associations and Water User Organizations (World Bank, 2012). A schematic representation of the actors' interaction for water resource management is shown in Figure 2-1. As can be seen, the local level government agencies such as RBCs and RBAs have no interaction with DBs and WUO. The interaction and respective responsibilities of the actors involved in water management, especially related to irrigation, drainage and flood protection will be analysed and discussed in detail in Chapter 5.1.

Other important actors at the central level directly involved in the governance of water resource are the Ministry of Energy and Industry (MEI) and the Ministry of Transports and Infrastructure (MTI). MEI plays an important role in the water sector since more than 90 % of the country's electricity is generated by hydro resources (MEFWA, 2009). It is responsible also for the approval of construction of new hydropower plants. Ministry of Transports and Infrastructure is, on the other hand, responsible for the supply of drinking water and wastewater treatment. The central government is however not the only actor involved in management of irrigation and drainage infrastructure. In 2010, the government transferred to

[8] Among others, Floods Directive (2007/60/EC) and Groundwater Directive (2006/118/EC).

local governments the ownership of 315 reservoirs, many of which are nevertheless not functional.

Figure 2-1: Institutional relationship in water sector governance



Source: Own illustration, adapted from Law 111/2012.

Also, management of many irrigation systems below the primary canal level is performed by participatory water user groups such as Water User Associations and Water User Organizations. A more detailed account of the management of irrigation and drainage systems will be given subsequently.

2.5 WATER GOVERNANCE FOR IRRIGATION AND DRAINAGE

Albania has an extensive irrigation and drainage network, which was built during the communist regime with the aim to increase agricultural production so that the self-sufficiency goal is met. Since the agriculture sector was organised around agricultural cooperatives and state farms, irrigation systems were designed to serve these large production units.

The designed irrigated capacity before the fall of the communist system was 420,000 ha, out of which 360,000 ha is currently potentially irrigated (MAFCP, 2011). The management of irrigation and drainage systems during the collectivized agriculture was performed by Water Enterprises (WE) – district-level public agencies in charge of dams, drainage and irrigation infrastructure – that were responsible for supplying agricultural cooperatives and state farms with water against a certain irrigation fee. Maintenance and operation activities were financed by the collected fees and often supplemented by state subsidies, but most of the times maintenance of irrigation systems were performed by the collective organizations themselves (DEDE, 1997; WORLD BANK, 1994).

These enterprises remained the responsible authority for water management at the district level until the end of 1999. The dissolution of agricultural cooperatives and state farms in 1991, coupled with lack of financial resources and ineffective institutional arrangement for maintenance made irrigation and drainage infrastructure fall in disrepair (WORLD BANK, 2010).

Facing this situation, in 1994, the Albanian government, with the support of the World Bank, started a broad reform, which unfolded in two forms: physical rehabilitation of the irrigation and drainage systems and institutional changes. The physical rehabilitation consisted in the upgrading of the irrigation and drainage infrastructure and enforcement of dams. The area covered by the rehabilitated irrigation and drainage infrastructure is 200,000 ha and 80,000 ha, respectively (WORLD BANK, 2010). That makes it more than half of the potentially irrigated agricultural land (346,020 ha) and nearly 30 % of the total agricultural land (695,520 ha) (MAFCP, 2012).

The institutional reform focused mostly on restructuring the water governance. Two important laws have been passed for this purpose. The first one, Law No 8518 dated 30.7.1999 "On irrigation and drainage", aimed primarily to establish Water User Associations (WUA) which would be in charge of operating irrigation systems at the secondary level and below. Their responsibilities range from canal cleaning and maintenance (secondary canals), water distribution and monitoring to setting water prices, fee collection and conflict resolution. These issues will be analysed in detail in Section 5.1 and Section 5.2 of the results' chapter.

Meanwhile, membership in WUA is voluntary, and served mainly as a contractual agreement that would regulate the supply of water needs and water fees. Nonmembers could also receive water from WUA but at higher costs than members (DEDE, 1997). The operation of higher-level irrigation infrastructure (primary canals, reservoirs and/or pumping stations) would be assigned to Federations of Water User Associations (FWUA), which are higher-level "participatory" entities comprising several WUA within one command area.

The second objective of the law was to transform the 36 Water Enterprises into 13 Drainage Boards (DB). These are also district-level state agencies, whose main focus will be on managing the drainage systems, but also on primary irrigation canals and dams when their responsibility has not been taken over by the local water user groups and when local user groups failed. The second law (Law no. 9860 "On Irrigation and Drainage", dated 21.1.2008 amended) aimed at transforming Water User Associations into Water User Organizations (WUO). The reason for this change is the failure of many of the WUAs and FWUAs to provide the required services (WORLD BANK, 2010). WUOs have basically a similar organizational structure as WUAs, but serve larger areas and would be responsible for the whole irrigation system, including dams and primary canals. Although in most of the cases, the infrastructure is transferred in-use for a period no less than 10 years, the law recognizes also the ownership and concession options. Also their legal status changes into a public entity, i.e. their performance is not only an issue for their members but concerns the general public interest. The WUO membership is no longer voluntary, but all farmers either owning or using land within the service area are entitled to equally benefit from WUO services. Currently, there are only 3 pilot WUOs operating in the country serving an area of 12 000 hectares.

A novelty in water institutions is the introduction of the local government (*Komuna*)[9] as an important actor in Albania's water governance. Currently, 315 small reservoirs together with the respective irrigation schemes have been transferred in ownership to local government units. An additional role of local government is to assist WUOs in fee collection.

This is a step forward in terms of the decentralization and devolution enterprise by transferring to local and lower-level actors not only management powers but also some degree of ownership over the infrastructure. However, although the higher degree of devolution and decentralization of management and property rights may encourage more involvement and responsibility from local actors to engage in continuous maintenance, the conditions of the transferred infrastructure and resource as well as the broader institutional set up should be carefully considered.

[9] In Albania, Komuna is a local level municipality, comprising several villages. The Mayor of the Komuna and council members are elected directly by the inhabitants of that jurisdiction. However, with the new administrative division enforced by the Albanian Parliament in 2015, Komuna, as an elected administrative unit, has ceased functioning. Currently, it has become an administrative unit under the responsibility of Municipalities, with reduced responsibilities and chairpersons are appointed by the Mayor.

CHAPTER 3 – THEORETICAL BACKGROUND

At the beginning of Chapter 3, I will provide key definitions of institutions and provide selected classifications of institutional change, which helps to explain the observed processes in natural resource management. Before deepening the theoretical discussion, it is necessary to have a heuristic map that will structure the thoughts and guide the analysis throughout the work. Irrigation systems, as a typical Common Pool Resource with water as the corresponding resource unit, together with the different actors involved and the governance structures regulating their use and maintenance constitute a dynamic complex social-ecological system (SES). The diagnostic framework for analysing the sustainability of complex Social-Ecological Systems (SES) developed by ELINOR OSTROM (2007) can be a relevant heuristic to link these issues together and explain the resulting outcomes.

Afterwards, the chapter proceeds with an elaboration of Common Pool Resource Theory and highlights some crucial aspects of Collective Action Theory applied to natural resource management. It is then followed by a discussion on the Resilience of Social-Ecological Systems (SES) and Adaptation of local communities to adverse climate events.

3.1 THEORIES OF INSTITUTIONAL CHANGE

The importance of institutions in structuring social and economic interactions among actors and the way institutions persist and change has been the focus of different traditions and schools of thought, from classical institutionalism to new institutionalist schools. And, within new institutionalism, four main strands of thought have been distinguished: historical institutionalism, sociological institutionalism, rational-choice institutionalism, and new institutional economics. The key differences between these traditions stand mostly in the core assumptions in general, from which they are guided by in analysing institutions and institutional change. Historical institutionalism emphasize that institutions emerge from and are embedded in concrete temporal processes, although it views them as consistent and stable constraints on behaviour; sociological institutionalism brings in the cultural aspect in analysing institutional efficiency; rational-choice institutionalism highlights the utility-maximizing nature of actors, who behave rationally-strategic and have stable preferences over choosing institutions (cf. HALL & TAYLOR, 1996; THELEN, 1999; VATN, 2005); and new institutional economics (NIE) that overlaps heavily with rational-choice institutionalism but emphasize the bounded-rationality and opportunistic behaviour of actors. Considering these disciplinary distinctions, having an appropriate and an accepted-by-all definition of institutions is far from being an established issue (HALL & TAYLOR, 1996; KINGSTON & CABALLERO, 2009).

3.1.1 Understanding institutions

In economics sciences, the most commonly used definition of institutions, which will be used in this thesis, is the one advanced by DOUGLAS NORTH (1990: 3): "institutions are the rules of the game in society, or more formally, … the humanly devised constraints that shape human interaction". With the rules of the game, NORTH (1990) implies both legal prescriptions such as laws, constitutions and regulations classified as *formal institutions*, and social norms, conventions, customs and codes of conduct classified as *informal constraints*. Formal institutions are legally introduced and enforced by state institutions, which are embedded in state operations based on laws that are enforced and monitored by the government. Meanwhile, informal institutions rely on enforcement methods not supported by the government, and are embedded in customs, norms, traditions, rules of conduct of a society.

Another important point considered in studying institutions is the distinction between institutions and organizations. While institutions are defined as the rules of the game, organizations are the players (NORTH, 1990: 4). Organizations are considered to be entities such as firms, universities, political parties, or various associations (water user associations/organizations can be one of them), which have a hierarchically-organized structure. This distinction treats organizations as an individual actor[10] which pursue their objectives to maximize their benefits and by acting as such may be also drivers of institutional change (NORTH, 1990; OSTROM, 2005).

3.1.2 Concepts of institutional change

After understanding what is meant with institutions and their functions, the next step in analysing institutions has been to explain how they emerge and change. As mentioned earlier, institutions serve to bring order and structure to social interactions, a function which could be performed by different sets of institutional arrangements. These institutional arrangements range from market instruments, social mechanisms to more hierarchical structures such as governments. There are, however, contending views what causes a change or modification of institutional arrangements. One view is that the choice of an institutional arrangement involves a cost-benefit comparison (LIN, 1989). ALCHIAN & DEMSETZ (1973) in their

[10] This distinction has however been criticized for ignoring the institution-nature of organizations, since they themselves involve structures or networks which cannot function without their own rules – for instance, rules of communication or membership (see HODGSON, 2006: 10).

analysis of property rights argue "the most important effect of alterations in institutional arrangements may well be the impact of such reorganization on the cost of transacting" (p. 22). According to DEMSETZ (1967) "a primary function of property rights is that of guiding incentives to achieve a greater internalization of externalities, since every cost and benefit associated with social interdepend-dencies is a potential externality (p. 348)." This view on institutional change is also called "Naïve Theory of Property Rights". Other authors argue that institutional change is an evolutionary process in which successful institutions evolve spontaneously through a competitive selection process that discards "inefficient" institutions, and thereby leading to optimal institutional configurations (HAYEK, 1973, cited in KINGSTON & CABALLERO, 2009). However, NORTH (1990) contended these arguments arguing that the emerging institutions will not be necessary efficient, otherwise what would explain the persistence of many inefficient institutions that are observed in the real world. Instead, according to North, institution-nal change occurs incrementally via a path-dependent process (NORTH, 1990).

Other important contributions to theories of institutional change point out the role of bargaining, power and conflict as drivers for changing an existing institutional set-up that could lead to intended or unintended outcomes. For instance, KNIGHT (1995) argues:

> *"….social institutions are a by-product of strategic conflict over substantial social outcomes. …social actors produce social institutions in the process of seeking distributional advantage in the conflict over substantive benefits. In some cases they will create institutional rules consciously. In other cases the rules will emerge as unintended outcomes of the pursuit of strategic advantage. In each case the main focus is on the substantive outcome; the development of institutional rules is merely a means to that substantive end" (p. 107-8).*

There is a consensus, though, between different approaches that some institutions are easier to change than others. In his economics of institutions framework, WILLIAMSON (1998) argued that a change in informal institutions could take decennia, whereas formal rules could change in a shorter time. The same view is shared by ROLAND (2004) who treats institutional change as a slow-moving and fast-moving process, where the slow-moving institutions are the informal constraints such as social norms and values which change slowly, incrementally and continuously over larger time spans, whereas fast-moving institutions are the formal institutions which may change rapidly and discontinuously (ROLAND, 2004: 116).

Relevant examples which best illustrates the fast-moving processes of institutional change are the transformative processes that accompanied the collapse of communist regimes in Albania and other CEE countries. The most distinct transformative processes were the changes in property rights and governance of land and other natural resources including irrigation systems (LERMAN, 2001; SIKOR,

2004; THEESFELD, 2005; VERDERY, 2003). The institutional reforms and outcomes were however far from being uniform, and the emergence of new institutional arrangements depended on the economic dimensions, as well as political and social factors and actors (PENOV, 2004; SCHMIDT & THEESFELD, 2012; SIKOR et al., 2009; STAHL, 2010; SWINNEN, 1999; THEESFELD, 2004). These aspects shape also the direction of institutional change, which can be: *voluntary, bottom-up design of institutional change* that emerges from inefficiencies of the existing institutional arrangements, and *top-down, imposed institutional change* that is enforced by an external authority, which could be the government when it imposes rules on how local communities should manage their resources, or even international bodies that request countries to change or align their overall institutional framework with international institutional arrangements (EU legislation for example).

3.1.3 Voluntary, bottom-up design of institutional change

Bottom-up, induced institutional change is defined as "the modification or replacement of an existing institutional arrangement or the emergence of a new institutional arrangement that is voluntarily initiated, organized and executed by an individual or a group of individuals in response to profitable opportunities" LIN (1989: 13). Profitable opportunities can arise from different factors. Several authors emphasize the role of changing relative resource endowments, technological change and property rights in bringing about institutional change (ALCHIAN & DEMSETZ, 1973; DEMSETZ, 1967; LIBECAP, 1989; RUTTAN & HAYAMI, 1984). For LIBECAP (1989) the distribution of benefits under the existing and proposed arrangements will determine the changes in property rights configurations.

Changes in natural resource governance can also be initiated at community level where the community members realize that the existing institutional arrangement is no longer beneficial to them. OSTROM (2005) has developed a nested multilevel hierarchical approach to explain this form of institutional change. She distinguishes three levels of rules: "operational rules" that govern daily activities, "collective-choice" rules that determine the operational rules, "constitutional rules" that determine collective choice rules, and the "meta constitutional rules" which are rules for choosing constitutional rules. KINGSTON & CABALLERO (2009) call this characterization a "collective-choice institutional change" that occurs when, after a cost-benefit analysis for the expected institutional change is performed by each individual, a minimum coalition of actors necessary to implement the change agrees to it. In Ostrom's characterization "operational rules" determine the cost and benefits each member of the community incurs by the institutional arrangement that is enforced. The choice of the voting rule that would determine the rejection or acceptance of the institutional change is then determined by higher-level rules. This form of institutional change is commonly found in self-organized groups for natural resource management, such as, for example, irrigation systems, fisheries, forests and pastures. In these settings, users – who are the major appropriators of the resource – are involved over time in making and adapting rules within collective-choice arenas regarding the inclusion or exclusion of participants, appropriation strategies, obligations of participants, monitoring and sanctioning, and conflict resolution (OSTROM, 1990). The effectiveness of rule change depends however on the rules themselves, i.e. how these rules shape actors' incentives and the structure of a given situation. OSTROM (1986) proposed a method for analysing rules, sorting them into seven categories: boundary rules, scope rules, position rules, authority rules, aggregation rules, information rules, and pay-off rules. This categorisation of rules has particular advantages for analysing institutions since it allows a comparative analysis across institutions and types of activities affected by them (for example, irrigation). These rules are summarised in Box 1 below.

Box 1 – Basic set of rules for analysing institutions

Boundary rules are those that determine who is in or out of a given situation. In irrigation system management, they determine who is served by the system, how the membership is defined, is the system part of a larger irrigation system, and are outside people involved in the system.

Scope rules determine what aspect of life or the world can be affected by actors. Because scope rules prescribe the domain within which users have effect, they may have substantial impact upon the users' sense of ownership over the common resource. If resource users have a fairly broad range of power over actual practices in the system, they are more likely to contribute to system maintenance and operation, even if certain activities are fairly constrained by formal institutions.

Position rules determine what positions or places exist in the system, how these positions are filled and how tenure in those positions is controlled. For example, whether irrigation user is a simple member or a council member, whether membership is determined by land ownership or land in-use, how council members are elected and for how long they are entitled to serve. They determine also positions in relation to the system for actors that are external, but still have some role in the irrigation system (government agency staff or private individuals can be such actors).

Authority rules define actions that are required, permitted or forbidden for each position. For example, in case of farmer-managed irrigation system, it may be that in one system any farmer can distribute water, while in another system, only the head of the village is allowed to do so. Authority rules would also define positions for agency staff in terms of what activities they are obliged to undertake.

Information rules determine what actors know, and must, may, or must not share with other actors. For instance, if works need to be done on the system, how must this information be shared, and to whom? Is there a particular frequency with which meetings must be held?

Aggregation rules determine how the actions or preferences of actors are converted into group decisions. All decisions may be made collectively, or through delegating them to group representatives. Another important aspect of aggregation rules concerns also the decision making process from external actors (for example, government staff), in the sense of whether farmers, for instance, have any say or provide any input in the decisions related to the management of their irrigation system.

Pay-off rules determine how benefits and costs are assigned to actions and distributed among the participants. In irrigation systems, pay-off rules would, for example, indicate the relation between a farmer's effort in cleaning and maintaining the system and the water received for irrigation. Or, if a farmer fails to contribute labour or financial resources, he may face sanctions either by not receiving irrigation water or by being fined.

Source: ELINOR OSTROM (1986: 19).

Nevertheless, LIN (1989) argues that for a new set of rules to be accepted and adopted, negotiation and agreement among individuals is required. As such, the adoption of the new rule necessitates collective action that would accommodate both beneficiaries and losers. According to OSTROM (2005) if the losers from the new arrangement are not compensated, powerful actors may block its adoption. Furthermore, the new institution is also a public/collective good and since free-riding is a core problem of public goods provision, this can lead to a second-order dilemma concerning who is going to bear the costs of monitoring the rules once they are agreed upon (OSTROM, 1990). Following North's distinction of institutions into formal and informal, the voluntary, induced, process of rule change resembles to informal arrangements, given that no government or state authority is involved in enforcing them. As mentioned earlier, informal institutions consists of norms, customs, habits and traditions and they are more difficult to change than formal rules such as state legislation or other regulations. As North points out "although formal rules may change overnight as the result of political or judicial decisions, informal constraints embodied in customs, traditions, and codes are much more impervious to deliberate policies" (NORTH, 1990: 6).

3.1.4 Top-down, imposed institutional change

On the other hand, many authors view institutional change as a centralized process which is "introduced and executed by governmental orders or laws" (LIN, 1989: 13). What motivates governments to undertake changes in the existing institutional arrangements depends on several factors. For example, LIN (1989) argues that the state may intervene to remedy the institutional undersupply that exist in the society. With institutional undersupply, it is meant the less than social optimal institutional arrangements that may emerge because of public good characteristics that institutional arrangements exhibit (i.e. free-rider problem).

Other authors argue that governments can undertake institutional changes to redistribute power and administrative capacities across local governments units or communities (AGRAWAL & OSTROM, 2001). Decentralization and devolution policies, for instance, are an example of the latter form of imposed institutional change. They can be incited by external or domestic pressures to facilitate transfers of power closer to those who are most affected by the exercise of power (AGRAWAL & OSTROM, 2001). The pressure can come from different actors such as international donors, local organizations and NGOs and even groups within central governments. To explain why governments give up some of its powers, AGRAWAL & OSTROM (2001) suggest that "central governments are best seen as congeries of actors who have different and perhaps conflicting objectives as they pursue a diversity of goals including power" (p. 487). This reflects the rationality assumption postulated in public choice theories which sees political parties and individuals as selfish utility-maximisers competing for votes (see for instance DOWNS, 1957). Hence, the outcomes of these policies or decisions may be less than socially optimal since the decision-maker's private costs and benefits may considerably deviate from the social costs and benefits (FREY, 1978: 90). Albania's and other CEE countries' land reforms for instance are an illustration of such a vote maximizing behaviour since the chosen reform options were primarily driven by political motives that would serve the ruling classes' interest and less by economic efficiency considerations (SWINNEN, 1999). However, the political motives and vote maximising behaviour of decision-makers are also conditioned by political process at international levels. For instance, accession into the European Union has imposed several conditions on Albania's national institutional framework so that it aligns with the EU legislation. In the case of water management, the overarching legal frameworks are the Water Framework Directive, Groundwater Directive and Floods Directive. The EU requirements influence not only the behaviour of decision-makers but also the goals, objectives and outcomes of the institutionnal arrangements and institutional changes.[11]

The utility-maximization behaviour is not an exclusive attribute of political parties or governments. Also bureaucrats who work in government offices at different levels are considered as actors who attempt to increase their own power, prestige,

[11] See SIKOR (2006) for an account on how environmental regulations (aligned with EU legislation) imposed on farmers of two CEE countries (Czech Republic and Poland) have shaped property relations and agrarian changes.

security and also income (Frey, 1978: 100). Having decentralization in focus, Agrawal and Ostrom (2001) hypothesized that "once the centre is recognized as being potentially divided, transfer of power can be hypothesized to take place when actors at the central level compete for power among themselves and find in decentralization a mechanism to enhance their access to resources and power in comparison to other political actors at the central level" (p. 487). Power competition is however not the only driver for imposing institutional changes. Often actors at the central level find that the new institutional arrangement can contribute to reduction of costs of their agency (and/or improvement of revenues), or even deflect blame (Agrawal & Ostrom, 2001). Cost reduction has often been considered another reasonable rationale for justifying some decentralization and devolution policies (Vermillion, 1997). However, for policies focusing on natural resource management, the positive role of communities has particularly been highlighted (Knox & Meinzen-Dick, 2001).

3.1.5 Devolution as institutional change

International policy and the research agenda on natural resource management have experienced a paradigm shift from a top-down approach to community-based strategies (Agrawal & Gibson, 1999; Andersson & Ostrom, 2008; Berkes & Pomeroy, 1997; Runge, 1986).

This shift is driven by the theoretical assumption that devolution leads to the equitable and efficient management of natural resources, because people are more likely to respect and follow rules when they have been involved in designing them (Larson & Ribot, 2004). Local knowledge derived from continuous interaction with the natural system and the involvement of local people in the rule making process, are important ingredients for making the rules not only functional but also for vesting them with legitimacy (Andersson & Ostrom, 2008; Jentoft & Mccay, 1995).

The costs of enforcement will thus be lower than for rules imposed by external forces, because enforcement and the legitimacy of rules develop trust among resource users that other users are complying with agreed rules and that no individual is benefiting over others (Gibson, Mckean, & Ostrom, 2000). Chhatre and Agrawal (2008), for instance, find that the probability of forest degradation declines with increases in the levels of local enforcement and local collective action, even in the presence of other factors such as the forest size and levels of dependence. Local enforcement is also influenced by their autonomy in decision making, as well as by effective leadership for conflict resolution (Ostrom, 2002). In that sense, the applications of the customary rules to the management of natural resources have shown significant positive impacts. Yet, not to be overlooked, imposed approaches to devolving the management of resources have often shown mixed results. Such moves bear potential disadvantages that could be caused by conflicting interests in the local communities, the likelihood of capture by local elites, and the abuse of power (AGRAWAL & GIBSON, 1999; SCHMIDT & THEESFELD, 2012; SIKOR et al., 2009; THEESFELD, 2008). In the course of Albania's agrarian change and its path towards the target of accession to the European Union (EU), several reforms in its agricultural and environmental policies have already taken place with devolution as the focus. Thus, since the late 1990s Albania has been in line with the international policy trend of transferring management power to local communities; e.g., it is one of at least 60 countries that claim to have reformed their natural resource management (AGRAWAL, 2001b). For instance, there has been an ongoing trend of transferring the management of irrigation systems to local communities as well as some form of ownership over forests and pastures to local governments and communities. The form of ownership in this case depends on what rights communities and local government have over the resources.

After having provided key definitions of institutions and selected classification of institutional changes, it is necessary to link them to processes of natural resource management. The theoretical discussion on these issues will be guided by the diagnostic framework for analysing the sustainability of complex Social-Ecological Systems (SES) developed by ELINOR OSTROM (2007).

3.2 SOCIAL-ECOLOGICAL-SYSTEM FRAMEWORK

Frameworks, theories and models are the building blocks with which the academy develops, tests and refines knowledge (EPSTEIN et al., 2013). Development and use of frameworks are the most general forms of theoretical analysis (OSTROM, 2011). For OSTROM (2011), frameworks identify the elements and general relationships among the elements that the researcher needs to consider for the analysis as well as organize diagnostic and prescriptive inquiry, but cannot explain or predict outcomes. Theories, on the other hand, enable the researcher to specify which elements of a framework are particularly relevant to particular questions and to make general assumptions that are necessary to diagnose a specific phenomenon, explain its processes, and predict outcomes that are derived by integrating multiple models. One specific characteristic of a framework is that it can be compatible with multiple theories (OSTROM, 2011), as it is the case of the Social-Ecological System Framework (SES framework) developed by OSTROM (2007)[12]. The SES framework is particularly designed for and has its strength in pointing to relevant variables that help to explain collective action and self-organization in natural resource management. Social-ecological systems are complex systems "in which some of the interdependent relationships among humans are mediated through interactions with the biophysical and non-human biological units"

[12] There are several frameworks for studying Social-Ecological Systems, such as the Panarchy concept developed by GUNDERSON and HOLLING (2002), the framework for analysing the robustness of SES proposed by ANDERIES et al., (2004), or the network perspective developed by JANSSEN et al., (2006).

(ANDERIES, JANSSEN, & OSTROM, 2004). SES systems exhibit a high degree of uncertainty that makes their long-term and sustainable management difficult to achieve. To analyse the sustainability of SES, Elinor Ostrom proposed a two-tiered framework where the main components of the social-ecological system are in turn decomposable into multiple subcomponents, to be used as needed by the researcher (Figure 3-1) (OSTROM, 2009). The first tier (Fig. 3-1: a) consists of eight primary components: (1) Resource system, (2) Resource units, (3) Users, and (4) Governance system, (5) External social, economic, and political settings, (6) Related ecosystems, (7) Interactions, and (8) Outcomes.

OSTROM (2007) posits that these eight main components comprise the broadest conceptual level, which serves as a conceptual map that can be used as the starting point by researchers for conducting the study of linked SESs. Each of these main components can be further unpacked into multiple conceptual tiers, and how far the researcher needs to go up and down the conceptual hierarchy depends on the specific empirical and policy question (ibid). Some of the subcomponents (second-tier) for each of the main SES components are presented in (Fig. 3-1.b). AGRAWAL (2001a) argues that the number of variables that can affect incentives, actions, and outcomes related to sustainable resource governance is relatively large, and, at the same time, raises questions about how research can be conducted in a cumulative and rigorous fashion if this many variables need to be identified in every study.

However, OSTROM (2007) argues that not all of these variables are relevant in every study, because SESs are partially decomposable systems. OSTROM (2007) identified three aspects of decomposability of complex subsystems that are important for achieving a better understanding of complex SESs. The first aspect is the conceptual partitioning of variables into classes and subclasses. The second aspect is the existence of relatively separable sub-systems that are independent of each other in the accomplishment of many functions and development but eventually affect each other's performance. The third aspect is that complex systems are greater than the sum of their parts (OSTROM, 2007: 15182). Also, in this thesis, I do not focus on all subcomponents, but consider only the ones that are relevant for investigating the factors that can have an impact on the likelihood of farmers to contribute to maintaining the irrigation and drainage canals; for understanding how communities respond to floods; and for assessing the role of the different governance structures that are responsible for the management of water resources in Albania. These components and subcomponents are presented below:

Resource System (RS) – The sector (RS1) of the resource system in this study is irrigation and drainage, and the resource system is composed of the irrigation and drainage infrastructure, surface water and agricultural land. Other important components of the resource system that affect the way the irrigation systems are managed and the way communities respond to floods are predictability of system dynamics (RS7) and human-constructed facilities (RS4) which in this case are the irrigation and drainage infrastructure.

Resource Units (RU) – The resource unit of the resource system (RS) is water (amount), which is mobile (RU1) and difficult to manage due to its spatial and temporal distribution (RU7). The amount of water in the resource system depends highly on temporal distribution (winter or summer) or spatial distribution (head-end to tail-end).

Figure 3-1: A diagnostic framework for analysing the sustainability of SES

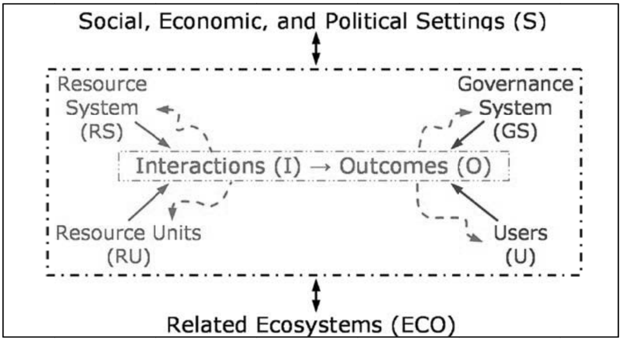


Figure 3-1 (a) – Framework's Tier I.

Source: OSTROM (2007: 15182).

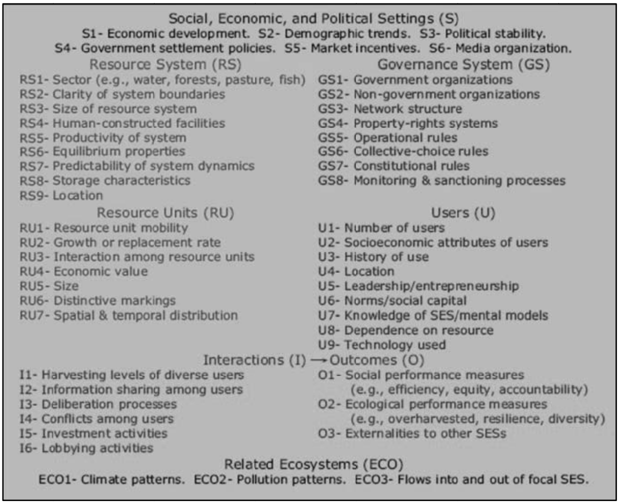


Figure 3-1 (b) – Framework's Tier II.

Source: OSTROM (2007: 15183).

Governance System (GS) – The governance system regulating water use in this study is composed of government organizations (GS1) and non-government organizations (GS2), whose functioning and performance depends on the three levels of rules; operational rules (GS5), collective-choice rules (GS6) and constitutional rules (GS7), as well as on the existing monitoring and sanctioning processes (GS8). Property rights (GS4) are also a key element that shapes the incentives of actors to invest resources in the management of irrigation systems. Operational rules are the daily activities performed in using and managing a resource system (for instance, water extraction, water allocation, monitoring, maintenance works); collective-choice rules are higher-level rules enforced by resource users to change/modify operation rules when they yield sub-optimal outcomes; whereas, constitutional rules are the rules that frame and enable the enforcement of collective-choice rules (OSTROM, 2005).

Users (U) – The main attributes of this component consist in the number of users (U1), their socio-economic characteristics (U2), norms/social capital (U6) and the leadership (U5) potentials that exist in the community. If the users will however not be dependent on the resource (U8), their incentive to invest in and maintain the resource base/infrastructure will be low (OSTROM, 2007).

Social, Economic and Political Setting (S) – Demographic trends (S2) and market incentives (S5) are the two attributes that shape the contextual setting for the case at hand.

Related Ecosystems (ECO) – Since most of the floods in the study area are induced by climate patterns (ECO1), this is another key variable that is relevant for the analysis.

Interaction (I) and Outcomes (O) – Another crucial element of the framework is to understand the interactions (I) between the different major components and the resulting outcomes (O) from these interactions. For example, for the maintenance of irrigation and drainage canals and adaptation to floods induced by climate patterns, key interactions consist in the investment activities (I5) and deliberation processes (I3), which would lead to accountability of involved stakeholders (O1) and resilience of the irrigation and drainage systems (O2).

This representation of the framework is only a sketch of the relationships between the different elements and possible outcomes from their interactions. The theoretical underpinnings of these relationships and the resulting assumptions will be explained by the subsequent theories.

3.3 THEORY OF COMMON-POOL RESOURCES

Common-Pool Resources (CPRs) are part of social-ecological systems (SES) and can be natural such as forests, pastures, fisheries and groundwater basins, as well as human-made such as internet and irrigation systems (Ostrom, 2009). The sustainable management of CPRs has proven to be a challenging task due to two inherent characteristics, subtractability and difficulties in exclusion. Subtractability means that one user's consumption of a resource unit subtracts from what is available to others. In irrigation systems, water spread on one farmer's field cannot be spread onto the field of another farmer. Difficulty of exclusion means that it becomes prohibitively costly to prevent non-users from consuming the resource or impose obligations on those who use it (Ostrom, Gardner, & Walker, 1994). The costs of exclusion can be affected by the biophysical characteristics of the resource, such as type and size, as well as socio-economic factors such as relative prices, social institutions that constraint actors, and technology available to enclose it (Ostrom, 1990). Fisheries, wildlife, groundwater and irrigation systems show exclusion difficulties due to the migratory nature of their resource units, such as fish, animals and unit of water pumped up or utilized for irrigation. For irrigation systems, these CPR features lead to two types of collective-action problems: appropriation problems and provision problems.

The appropriation problems are connected to the allocation of the flow of resource units, i.e. how to allocate a fixed, time-independent quantity of resource units in order to avoid rent dissipation and reduce uncertainty and conflict over the assignment of rights. Another type of appropriation problem relates to the assignment of spatial or temporal access to resources. For instance, farmers who extract water from the top of an irrigation system can obtain more water than farmers located at the tail-end of the system (Ostrom, 1990: 48).

The provision problem is connected with investments in constructing the infrastructure and on organizing regular maintenance that will sustain the resource system over time (Ostrom, 1990: 49). Due to the social dilemma, when the social benefits of an individual investment are shared by all – communities face difficulties to motivate everybody to engage in investments to keep the resource in a productive state.

Although all components of SES framework are relevant and equally important for analysing CPR management, the governance structure component (GS) and resource users (U) have been considered particularly important for explaining the success or failure of many management efforts undertaken by the involved actors, be it individuals, local communities or governments.

As mentioned earlier, success or failure in managing natural resources depends on the property regime (GS4) governing these resources. These resource regimes can be state property, private property, common property and open access (Bromley & Cernea, 1989; Dietz, Ostrom, & Stern, 2003). The essential element that differentiates between these regimes stands on the possibility to exclude other individuals from extracting benefit streams from the resource. For instance, under private property, the right of exclusion of others by the owner is recognized by the community and the benefits are enjoyed only by the rights-holder (DEMSETZ, 1967). Under state property, the state has the coercive power to exclude anyone from the right to use the resource as well as to regulate the appropriation mechanisms (HARDIN, 1968). Meanwhile, open access and common property have often been confused. Many scholars have attributed to resources governed in common the attributes of open access. Garret Hardin's influential article "Tragedy of the Commons" provides the best illustration. Open-access inherits no restriction characteristics. It is no one's property (BROMLEY & CERNEA, 1989; COLE, 2002). In open-access regimes, the availability of resource is threatened if they are subtracted beyond their regeneration capacity (PERMAN, MA, MCGILVRAY, & COMMON, 2003: 584-585). This pattern of use is very likely to deplete the resource stock unless restrictive instruments are introduced to regulate actors' interaction with one another and with the resource itself, given that they will tend to pursue their own self-interest, by using more and more of the resource and bearing just a faction of the costs. This would lead to the tragedy that HARDIN (1968) had in mind.

Common property is not a free-for-all regime, and as BROMLEY (1992) has noted, the difference between the two regimes stand on the concept of property. Property, according to him, is "a secure claim on a future benefit stream" (BROMLEY, 1992: 11). Under common property, the resource is controlled by an identifiable community of interdependent users, who can on the one hand, restrict access to outsiders and, on the other hand, regulate the patterns of use by members of the group. For BROMLEY (1992: 14), "irrigation systems represent the essence of a common property regime. There is a well-defined group whose membership is restricted, there is an asset to be managed (the physical distribution system), there is an annual stream of benefits (the water which constitutes a valuable agricultural input, and also a threat if there is too much of it), and there is a need for group management of both the capital stock and the annual flow (necessary maintenance of the system and process for allocating the water among members of the group of irrigators) to make sure that the system continues to yield benefits to the group". However, often irrigation systems are managed by multiple actors, whose responsibilities may not be clear and property rights overlapping. That requires that property rights are clearly defined since unambiguous property rights convey authority and shape incentives for both, provision of infrastructure and continuous maintenance (MEINZEN-DICK, 2014; SCHLAGER & OSTROM, 1992; WADE, 1988). ALCHIAN and DEMSETZ (1973) developed the concept of "bundle" of rights that include the right to use, alienate and transfer property. The concept of "bundle of rights" was further elaborated by SCHLAGER and OSTROM (1992), breaking down the use concept into management, withdrawal and access rights. This way of specification of rights provides a basis for understanding how property rights structure the incentives of farmers to invest on agriculture land and on management of natural resources.

Some form of collective action by resource users (U) may help avoid the destruction or improve the conditions of natural resources. Yet, encouraging resources users to engage in collective action is rather challenging because resource users are uncertain about the future actions of others. Neoclassical economic theory has sometimes been ineffective to explain what motivates individual behaviour to act collectively. Its economic analysis is driven by the hypothesis that individuals make independent choices with the aim to maximizing their personal well-being. It follows from the assumptions that individuals are equipped with complete information, which enables them to make rational decisions that serve best to their interests, and that their preferences do not change. However, SIMON (1985) called for a more careful consideration of the nature of the human being. According to him, humans have the intention to be rational but are often constrained by physical and cognitive capacities (for instance, capacities of the brain to receive, store and process information). This makes individuals bounded rational, limiting their ability to identify and foresee future contingencies. Another human factor that affects individual rationality is the concept of opportunism which involves self-interest and that is reflected in passing on selective or distorted information and showing non-credible commitment regarding future conduct (WILLIAMSON, 1985). Thus actors need to invest more resources to monitor each other's commitment and sanction defections. This will consequently increase the costs of cooperation since actors may want to avoid losses in their incomes or efforts (KAHNEMAN & TVERSKY, 1979).

3.3.1 Design principles for long-enduring self-organized irrigation systems

Nevertheless, despite evidenced management failures, collective action problems have proven not to be insurmountable, since many CPRs including irrigation systems have been successfully managed for hundreds of years in various settings all over the world[13]. But the question that rises then is what has made some CPRs to be successfully managed by communities and some not. Through an extensive work, ELINOR OSTROM in her seminal book "*Governing the Commons*" (1990) has identified eight design principles (GS5, GS6, GS7) that are found to be present in successful self-governed systems:

1 – Clearly Defined Boundaries: The first design principle associated with sustainable CPR governance institutions is the establishment of clearly delineated boundaries around the resource and resource users (OSTROM, 1990; 1992). She suggests that "individuals or households who have rights to withdraw resource units from

[13] An extensive list of studies on Common Pool Resource management from all over the world can be found in the Digital Library of the Commons http://dlc.dlib.indiana.edu/dlc/.

CPR must be clearly defined, as must the boundaries of the CPR itself" (OSTROM, 1990: 91). This will provide exclusion for non-members of the group and will reduce uncertainty over what has been harvested and who is harvesting or investing on the resource. Consequently, resource users will be more inclined to contribute to maintaining their common resource as the group members will be the ones who will collect the benefits the resource will provide. Nevertheless, the problems of common pool resources are not and cannot be solved only by clearly defining the boundaries of the resource and of the group. It can be considered the first step for stable and long-lasting cooperation among actors.

2 – Congruence between Appropriation and Provision Rules and Local Conditions: Matching use rules of the community with local conditions can increase the likelihood of a long-lasting management of common pool resources. This may require good and reliable information about stocks, flows, and processes within the resource system under use, as well as about the human-environment interactions affecting the system, which consequently can help to create a better understanding of the dynamics of the system and equips community members with a valuable asset for making sound decisions (DIETZ et al., 2003). For irrigation systems, the amount of irrigation water is related to rules requiring labour materials and money inputs (OSTROM, 1992).

3 – Collective-Choice Arrangements: The institutionalized common pool resource management calls for the need of a more flexible institutional environment. That implies that actors should have the ability to participate in changing and modifying, with the lowest costs possible, their daily rules (operational-level rules) when they are affected by them (OSTROM, 1990). Additionally, characteristics of a resource (for instance, physical conditions in term of offering future opportunities and spatial extent) may affect both the benefits and costs of institutional change. If resource system is relatively degraded, there will be high costs for users to organize, and the benefits derived from such an organization may not be substantially significant. Thus, institutional change is likely to occur only after appropriators observe substantial scarcity (OSTROM, 2002). On the other hand, scarcity reveals uncertainty over the future availability of the resource, increasing in this way its present value. Therefore, appropriators' commitment to the newly established rules may need frequent and regular monitoring to detect any ex-post rule violation, or opportunistic behaviour.

4 – Monitoring: Monitoring is another very essential principle for sustaining common pool resource (CPR) institutions. OSTROM (1990) brings the example of Spanish Huertas to illustrate the fact that community members themselves monitor each other for rule compliance. In these settings, farmers waiting for their turn to irrigate watch closely other farmer/s already using the water. Community members in self-governed settings would create a better knowledge of each other and a history of past commitment to communal rules. In this way, they will be equipped with information that will help them to make strategic decisions regarding future design of rules. Nevertheless, observation of rule violations/violators alone will not guarantee a long-term commitment to the common rules. Compliers will avoid further commitment as they perceive they are being considered suckers. On the other hand, the dominant strategy for rule-breakers will be non-compliance, if their benefits will remain higher as compared to costs of non-compliance.

5 – Graduated Sanctions: As mentioned above, individuals in a CPR setting have an interest in monitoring one another whether the rules are followed, though by just detecting violators and violations will not make them refrain from their opportunistic behaviour and free-riding. As OLSON (1965: 2) observed, "unless there is coercion or some other special device to make individuals act in their own common interest, rational, self-interested individuals will not act to achieve their common or group interests". Sanctioning is thus one of the mechanisms to induce rule compliance and it should be primarily directed toward individuals who heavily exploit the common pool resource. OSTROM (1990) suggest that sanctioning level should not be rigid or standardized. It is rather more effective to impose modest sanctions on first offenders, and gradually increase the severity of sanctions for those who do not learn from the first or second encounter.

6 – Conflict Resolution Mechanisms: Although the above mentioned principles are crucial for sustaining successful and long-lasting CPR institutions, they are not sufficient for ensuring smooth implementation in the field. Therefore, mechanisms for resolving conflicts (when they arise) are important for the endurance of the institutional arrangements designed by actors themselves, although such mechanisms are not a guarantee for maintaining lasting institutions (OSTROM, 1990). Given that actors do not possess perfect information about the state of the system and actions of other actors, the system can become fragile from within due to conflicts as to the interpretation of rules, whether certain agents have indeed broken a rule, and the nature of the appropriate punishment. Even then, conflicts can occur as to the interpretation of rules and without regular access to low cost and rapid conflict resolution mechanisms mediate this internal noise in the system by reinforcing, the common understanding about what rules mean (ANDERIES et al., 2004). These mechanisms are important especially in countries in transition such as Albania where there is weak law enforcement and corruption, because they have often proven to be more effective than external authorities, such as courts in addressing conflicts (DE WAAL, 2004; STAHL, 2010). However, such mechanisms should be all-embracing to include also other stakeholders that may have an interest on the CPR, like state or commercial actors. The processes of setting up co-management agreements that codify the rights and responsibilities of involved parties reduce conflicts and might even function as a more long-term problem solving mechanism (DIETZ et al., 2003). Successful reduction of conflicts is essential for long-term planning and for the willingness among individuals to invest in creating appropriate institutions (OSTROM, 1990).

7 – Minimal Recognition of Rights to Organize: This principle somehow "formalizes" the efforts of actors to organize and devise that system of rules that serves best their interests, which of course should not clash with the concept sustainable management and use of the common pool resource. Locally evolved and devised systems of norms, rules, and property rights that are not recognized by external authorities may collapse if their legitimacy is challenged (OSTROM, 2000). Irrigation schemes in Japan have shown that when external authorities recognize and support self-governed institutions, the collective arrangements have performed sufficiently well, contributing also to the strengthening of group cohesion and social capital (SARKER & ITOH, 2001).

8 – Nested Enterprises: This design principle incorporates all above mentioned rules but it has to be extended to larger resource systems, involving multiple use activities. This nesting of rules makes the CPR governance smooth and long-lasting.

As can be shown, the institutionalization of actors' interaction in a community provides solid grounds for sustainable and enduring CPR management. These principles have been successfully applied in studying the management of self-governed irrigation systems (see OSTROM, 1992). The success of such institutions though depends on how many of these design principles are in place and enforced by actors. OSTROM (1990) suggests that when there are adopted only some of the principles, the institutional setting will be fragile and may not resist over long periods of time. To evaluate the robustness of these principles over time, COX et al., (2011) conducted a review of 91 studies on Ostrom's design principles, in which they found that the principles are empirically well supported, but suggested reformulation and division of Principle 1, 2 and 4 into separate components in order to analyse them in detail.

In addition, institutional arrangements alone may not be sufficient for maintainning cooperation within the community. The conditions of the resource and the attributes of users play also a significant role in achieving successful governance of common pool resources and encouraging collective action from the part of local users. OSTROM (1990; 1992), BALAND & PLATTEAU (1996) and AGRAWAL (2001) have identified several variables in that regard. Some of these variables and their impact on collective management of natural resources will be discussed subsequently.

3.3.2 Characteristics of users and attributes of the resource impacting on collective action

Game theoretical models and numerous case studies have provided important insights into the sustainability of cooperation among rational self-interested actors with respect to management of natural resources. While game theoretical models focus on the strategic interaction of self-interested actors, considering the cost-benefit incentives that guide their (non)cooperative strategies, case studies provide deeper understanding, considering the institutional, socio-economic and physical world, whose attributes shape the settings where the interactions take place. Inequalities in wealth and resource endowments (U2), resource scarcity (U8), trust (U6), exit options, distance to markets (U4), leadership (U5), group size (U1), dependency on the resource (U8) are some of common variables identified as being important for collective action (AGRAWAL, 2001; ARARAL, 2009; BALAND & PLATTEAU, 1996; MEINZEN-DICK, RAJU, & GULATI, 2002; OSTROM, 1990; TANG, 1992; THEESFELD, 2004; UPHOFF, WICKRAMASINGHE, & WIJAYARATNA, 1990). Nevertheless, as ARARAL (2009) argues there is no consensus on the size, direction and significance of the effects of all those variables.

Starting with inequality, there are different views how inequality in endowments effects collective action. BALAND & PLATTEAU (1999) point out the ambiguous role of inequality on collective action arguing that this is not a one-to-one relationship. For instance, in his seminal work, OLSON (1965) argued that in groups with unequal endowments and interests, a dominant actor who enjoys enough benefits compared to his/her costs from the provision of the collective good will continue to contribute although he or she would have to incur large parts of the costs. On the other hand, there are also arguments pointing out the negative impact of inequality on collective action[14]. BARDHAN (2000), in a case study in India, found out that the quality of maintenance of the distributaries and field canals is lower where there is high inequality of landholdings (U4).

Also for distance to closest markets (S5), no consensus exists on the direction of the effect. One argument is that farmers distant from market centres may face high transaction costs to bring the produce to the market, reducing this way their incentive to fully engage in agriculture, thereby affecting also their incentives to engage in collective action for maintenance of the irrigation systems. The other argument views the closeness to market distance as a proxy for exist options, with discouraging effects on collective action (see ARARAL, 2009).

Institutional arrangements (GS4, GS5, GS6, GS7 and GS8) and governance structures (GS1 and GS2) are considered key factors on the sustainable management

[14] For a more elaborate discussion on the role of inequality on collective action in irrigation systems see BARDHAN & DAYTON-JOHNSON (2002).

of natural resources (Ostrom, 1990). Although no panaceas exist on how to deal with environmental issues and solving collective action problems related to SES management (Ostrom, 2007), many empirical studies have pointed out that farmer-managed have exhibited higher rule conformance, fairer water allocation, better maintenance of irrigation system than government/bureaucratic-managed systems (Lam, 2001; Meinzen-Dick et al., 2002; Ostrom, Lam, Pradhan, & Shivakoti, 2011; Tang, 1992). Araral (2009) found out in his study of irrigation systems in the Philippines that farmers could solve collective action problems when given full management autonomy. This was reflected in lower levels of free-riding on monetary contributions for maintenance of irrigations canals and in the ability to better address water scarcity.

Water scarcity (U8) is itself an issue with significant impacts on collective action. It is argued that when the resource is abundant or very scarce, collective action is more difficult to achieve (Fujiie, Hayami, & Kikuchi, 2005; Uphoff et al., 1990). For example, if no water reaches farmers' fields, then he/she will not pay for something he/she does not receive. Also farmers that receive abundant water are less inclined to contribute for the maintenance of infrastructure since they will get water anyway. These two issues are commonly referred to as provision-appropriation problems (Janssen et al., 2004).

Ostrom (2000) argues further that for local actors to organize, feasible improvements to resource conditions (RS7), coupled with a low discount rate of their perceived future benefits and a common understanding of the way the resource functions should be possible.

The way benefits are perceived and discounted depends also on the number of actors (U1) using the resource. There are contending views on the effects of group size on collective action in managing natural resources. For example, Olson (1965: p. 2) argued that "unless the number of individuals in a group is quite small, rational, self-interested individuals will not act to achieve their common or group interests". Ostrom (1990) goes in the same direction, arguing that if only few actors need to cooperate in order to produce sufficient collective benefits, then the number of actors in the cooperative arrangement should be small. Similarly, there are cases when a large number of actors can provide public goods more efficiently that smaller ones (Isaac, Walker & Williams, 1994). Meanwhile, Agrawal & Goyal (2001), while studying the impact of group size on fund-raising for financing third-party monitoring of forests, found out that medium-sized groups perform better than small and large ones. The key idea is that the optimal number of actors must be consistent with the amount of individual and community benefits and costs expected from managing the resource collectively (Ostrom, 1990). The size of the group, though, reveals only one part of the social construct of a community.

Social capital (U6) is another component of the social structure of a community (COLEMAN, 1990). It is considered crucial for self-organization and collective action required for management of SES, part of which are irrigation systems (OSTROM, 2009). As AHN and OSTROM (2008) argue, social capital can be expounded as how cultural, social and institutional aspects of communities of various sizes jointly affect their capacity of dealing with collective-action problems, or alternatively, as an attribute of individuals and of their relationships that enhances their ability to solve collective action problems. Leadership (U5) and trust (U6) are considered very important elements of social capital and user characteristics that are likely to increase the chances for self-organization OSTROM (2000). Leadership contributes to the social capital of a community, as leaders act as catalyst encouraging collective action and fostering public participation in resource management (FOLKE et al., 2005), whereas low levels of trust, it is argued, lead to low involvement in collective action and cooperation in the management of irrigation systems (see MEINZEN-DICK et al., 2002; OSTROM, 1990; THEESFELD, 2004; WADE, 1988).

Problems of cooperation and local organization characterized by low levels of trust are widespread in former Eastern Bloc countries (ROSE-ACKERMAN, 2001). They are inherited from the past communist legacy, where the organization of communities into cooperatives and the forcing of people into "voluntary" work made people felt being exploited by the communist regime (DE WAAL, 2005), and were enhanced by rent-seeking behaviour during the transition period (STAHL, 2010; THEESFELD, 2008, 2011).

Trust is considered to be also a powerful means for reducing transaction cost of reaching an agreement, enforcing and monitoring resource management rules (PRETTY, 2003). WILLIAMSON (2000) suggests that although everybody prefers provision of public good to lack of it, lack of trust preclude the incentives to contribute to its provision since everybody fears that others will defect and not contribute.

3.3.3 Adaptive governance

In much of the literature focused on the management of complex adaptive systems, collaboration and participation and institutional polycentricity are commonly identified as key principles and institutional prescriptions for achieving adaptive governance (DIETZ et al., 2003; FOLKE et al., 2007; HUNTJENS et al., 2012; HUITEMA et al., 2009; OLSSON et al., 2006; PLUMMER et al., 2012).

Borrowing from HUITEMA et al. (2009), participation here refers to collaboration between governmental (GS1) and non-governmental actors (GS2). Collaboration between governmental and non-governmental actors is considered an important theme in the governance literature on common-pool resource management (OSTROM, 1990). It is argued that exclusion of local actors from management and decision-making processes may not only prevent them from giving valuable inputs deriving from their experiences with and knowledge of the surrounding environment, but, worst, may affect their adaptation strategies and livelihoods, causing also erosion of their social resilience (ADGER, 2006; OSBAHR et al., 2010). Implicitly, adaptive governance involves devolution of management rights and power sharing that promotes participation (FOLKE et al., 2005). According to HUITEMA et al. (2009), participation in public decision-making would improve the quality of decision making by opening up the decision-making process and making better use of different sources of information, as well as might stimulate the different government bodies involved to coordinate their actions more in order to provide serious follow-up to the inputs received. Furthermore, they argue that public participation would be imperative whenever government does not have enough resources, such as financial and information, to manage an issue effectively, as is usually the case in water management (HUITEMA et al., 2009: 26).

Polycentricism and multi-layered institutions are considered another important institutional prescription for adaptive governance. In the governance literature, polycentric governance systems are defined as systems in which "political authority is dispersed to separately constituted bodies with overlapping jurisdictions that do not stand in hierarchical relationship to each other" (SKELCHER, 2005: 89).

Theoretically, an adaptive governance system requires a structure of nested institutions that are complex, redundant, and layered, and institutional diversity which includes a mixture of market, state, and community organizations at the local, regional, and state levels, connected by formal and informal social networks (DIETZ et al., 2003). Networks create cross-level and cross-scale linkages that allow for broad participation and experimentation to harmonize at a system-wide scale, as well as serve to encourage diversity and mobilize social capital (FOLKE et al., 2005).

Furthermore, polycentric governance systems are supposed to be more resilient and better able to cope with change and uncertainty (HUITEMA et al., 2009). BERKES and FOLKE (1998) argue that organisational structures with multiple, relatively independent centres create opportunities for the evolution of appropriate local institutions through enhancing institutional incentives and strengthening monitoring and feedback mechanisms. For OSTROM (2005), local resource governance units can be encouraged to speed up the exchange of information about relevant local conditions and about policy experiments that have proved particularly successful (p. 283). LEBEL et al. (2006) argue further, local governance arrangements can develop to better match the dynamics of the geographical contexts with different ecological and social contexts, and that local knowledge can inform local actions in ways that a single centralized system cannot.

However, regardless of the stated advantages, polycentric governance may be threatened by coordination problems, fragmentation and duplication of responsibility and authority and inconsistency of policies between and across levels of government (HUITEMA et al., 2009; LEBEL et al., 2006). For example, when the different parties continue to defend their bureaucratic turf, fragmentation can result, and conflicts and competency struggles between the different units may erupt (KEMPER et al., 2005 cited in HUITEMA et al., 2009). For IMPERIAL (1999), fragmentation or duplication of authority in polycentric governance systems is not always a bad thing, though. He argues that when sufficient collaborative efforts are made and trust has developed, polycentric governance could be both efficient and effective.

In either case, the goal of any governance approach is to improve or maintain the sustainability of natural resource management, which often requires changing institutional arrangements, modifying policies and improve the coordination between the involved organisations (IMPERIAL, 1999).

3.4 ADAPTATION AND RESILIENCE OF SOCIAL-ECOLOGICAL SYSTEMS

As discussed above, much of CPR management scholarship is concerned with the long-term sustainability of the resources and with maintaining collective action over time. It however provides little insights on the way collectives (re)act when facing with uncertainty induced by adverse climatic events, such as for example floods and drought, or by rapid socio-economic and political processes that bring about drastic changes in the social setting. This comes from the presumption that communities or other actors involved in managing these resources can predict and control change in these systems (WALKER et al., 2002).

Recent advancements in the study of social-ecological systems (SES), where CPR are managed suggest that instead of controlling change, SES management should focus on the capacity of these systems to cope with, adapt to and shape change (BERKES, COLDING, & FOLKE, 2003; FOLKE, 2006; SMIT & WANDEL, 2006).

There has been substantial progress in understanding the social dimension for dealing with uncertainty and change in resource and ecosystem dynamics. One approach proposed by scholars studying social-ecological systems is to focus on maintaining and increasing the resilience of system (WALKER et al., 2002). It is argued that managing for resilience enhances the capacity of the system to cope with whatever future brings and to sustain desirable pathways for development in changing environments (ADGER, ARNELL, & TOMPKINS, 2005; FOLKE, 2006; WALKER, HOLLING, CARPENTER, & KINZIG, 2004).

3.4.1 Resilience

The resilience perspective emerged in ecology with contributions from C. S Holling, mainly within the ecological stability theory[15]. Holling defined resilience "as the capacity that determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables and parameters, and still persists (HOLLING, 1973: 17). Following CARPENTER and colleagues (2001), social-ecological resilience is interpreted as the amount of disturbance a system can absorb and still remain within the same state or basin of attraction, the degree to which the system is capable of self-organization (versus lack of organization, or organization forced by external factors), and the degree to which the system can build and increase the capacity for learning and adaptation.

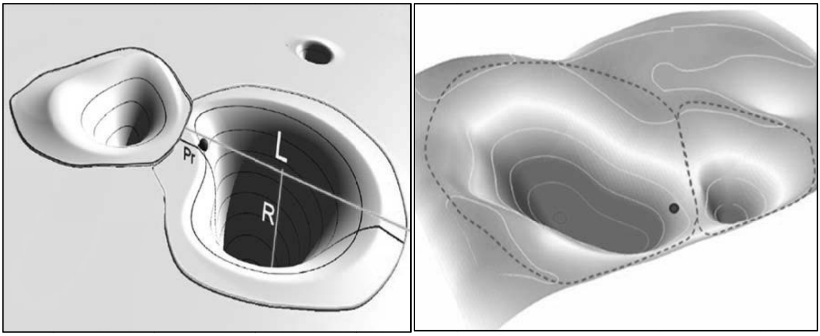
As can be noticed, the resilience concept is associated with other concepts that point out the dynamic, non-linear and hierarchical nature of social-ecological systems. These concepts include states, state variables, state space, basins of attraction, stability landscape, regimes and thresholds[16]. The state of a systems has been described "as the collection of values of the state variables at that particular instant in time" (WALKER et al., 2002: 5). The state variables are the elements that define the state space. For example, the state space of a rangeland system at any point in time is defined by the amount of grass, shrubs, and livestock. Meanwhile, a "basin of attraction" is a region in state space in which the system tends to remain (ibid). If there is only one basin of attraction then the set of states in the basin is equal to the set of states in the system's state space. The boundary between two basins of attraction is known as a threshold, whereas the various basins that a system may occupy, and the boundaries that separate them, are known as a "stability landscape" (COX, 2010; WALKER et al., 2002). Figure 3-2 illustrates a stability landscape with two basins of attraction and three aspects of resilience, L (latitude), R (resistance) and Pr (precariousness). The ball illustrates the changes that can happen to the stability landscape.

These changes can be in the number of basins of attraction; in the L (latitude) between basins, which is the maximum amount a system can be changed before losing the ability to recover; in the "depths" of basins R (resistance), which shows how easy or difficult is to change the system; in its position within a basin relative to the edge Pr (precariousness) (Fig. 3-2.a), which shows how close the current state of the system is to the threshold; or moves it into a new basin of attraction (Fig. 3-2.b) (WALKER et al., 2002).

[15] For a review of the emergence of resilience perspective see FOLKE (2006).

[16] For an overview of key concepts related to resilience see: http://www.resalliance.org/index.php/key_concepts.

Figure 3-2: Three-dimensional stability landscape



a) b)

Source: Adapted from WALKER et al. (2004).

Considering these properties, two definitions of resilience have dominated scholastic debate in ecology. One that measures the time it takes the systems to return to equilibrium after disturbance, known as *engineering resilience*, and the other that measures the magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables and processes that control behaviour, known as *ecological resilience* (HOLLING, 1996: 33).

Now, a question that arises naturally is how can the concept of resilience be applied to the social component of an SES, or as COX (2010) puts it, what are the relevant state variables in a social system that interact to produce self-reinforcing set of relationships?

COX (2010) in his study of the SES dynamics in Taos Valley's irrigation systems (acequais) derived ideas from game theory of repeated situations, where agents are presented with two choices, cooperate or defect. In these settings, agents are conditional co-operators relying largely on reciprocity which means they cooperate if others also cooperate and the opposite. That implies two possible alternative self-reinforcing equilibria and the decision to choose one of the two possible options depends on reciprocity. Reciprocity in turn is determined by the level of trust between the agents and other social factors such as norms and customs that have an impact on agent's reputation.

The applicability of the resilience concept for studying social changes has received an increasing attention in social sciences, where many scholars have recently analysed the relation between ecological and social resilience. THEESFELD and MACKINNON (2014), for instance, analysed the social resilience in the prior-appropriation water rights system of the Western US and the ability of that water right system to withstand external drivers with incremental changes as a course of successful adaptation, indicating resilience. ADGER (2000) has defined *social resilience* as the ability of human communities to withstand external shocks to their social infrastructure, such as environmental variability or social, economic and political upheaval, all of which Albania experienced during the transition period after the fall of communism. Such a perspective allows to track how communities can respond to extreme events and uncertainties as well as how the decision making process is organized.

Since the relations and interactions between societies and environment are regulated through institutional structures, they are a key component for linking social and ecological resilience (ADGER, 2000). Institutions themselves can be persistent, sustainable and resilient, depending on various factors such as legitimacy and maintenance of social capital. Consequently, institutional resilience is determined by their inclusiveness and degree of trust, and by their effectiveness in regulating social interactions (HARRISS & DE RENZIO, 1997).

The concept of resilience, though, should not be viewed as disconnected from other social-environment relations, particularly in the view of climate changes. It is clearly related to other concepts, such as vulnerability and adaptation[17] (BROOKS, 2003; FÜSSEL, 2007; IPCC, 2001, 2007, 2014; KASPERSON et al., 2005; LUERS, 2005; NELSON, ADGER, & BROWN, 2007; TURNER et al., 2003). In a broader sense, vulnerability is defined as the susceptibility to damage, and is often characterized in terms of the sensitivity to or exposure of a system to shocks, stresses or disturbances, the state of the system relative to a threshold of damage, and the system's ability to adapt to changing conditions (IPCC, 2001; LUERS, 2005; TURNER et al., 2003). As indicated by the definition, vulnerability and resilience concepts share common elements of interest such as the shocks and stresses experienced by the social-ecological system, the response of the system, and the capacity for adaptive action (ADGER, 2006: 269). According to ADGER (2006), the vulnerability of social-ecological systems is influenced by the accumulation or erosion of elements of social-ecological resilience including the ability to absorb the shocks, the autonomy of self-organization and the ability to adapt both in advance and in reaction to shocks. Then, the point is what kind of adaptations should be taken so that a social-ecological system reduces vulnerability and maintains and enhances its resilience in the face of shocks or disturbances derived by adverse climate-induced events such as floods.

[17] For an elaboration of the three concepts and their interconnectedness see also the special issue of the *Journal Global Environment Change, Vol. 16, Iss. 3*, (2006) on Resilience, Vulnerability, and Adaptation: A Cross-Cutting Theme of the International Human Dimensions Programme on Global Environmental Change, edited by MARCO JANSSEN and ELINOR OSTROM.

3.4.2 Adaptation

Similar to resilience, the concept of adaptation has its origins in natural sciences and refers to the behavioural characteristics which enable organisms and systems to cope with environmental changes in order to reproduce and survive (SMIT & WANDEL, 2006; WINTERHALD, 1980). In social sciences, it deals with human responses to different disturbances and shocks. The most commonly used definition of adaptation in environmental and climate change literature refers to "the adjustment in social, ecological and economic systems in response to actual or expected climatic stimuli and their effects and impacts" (SMIT & PILIFOSOVA, 2001: 881). Other scholars with a more resilience-inclined view of adaptation define it as "the decision-making process and the set of actions undertaken to maintain the capacity to deal with future change or perturbation to a social-ecological system without undergoing significant changes in function, structural identity, or feedbacks of that system while maintaining the option to develop" (NELSON et al., 2007: 397). In both cases, adaptation refers to the process, action or outcome in a system (household, community, group, sector, region or a country), in order for the system to better cope with and adjust to changing conditions (SMIT & WANDEL, 2006). The climate environmental change literature point out that the adaptation processes involve a change in a system and come about in different forms depending on the purposefulness, time, decision-making level (actors) and scale of adaptation (SMIT & PILIFOSOVA, 2001). In terms of purposefulness, SMIT et al., (2000) distinguish between *autonomous or spontaneous* adaptations and *planned or deliberate* intentional adaptive responses. In unmanaged natural systems, adaptations are considered to be autonomous, whereas in human systems, adaptations can be a combination of the two forms, depending on who takes the adaptive actions. For example, adaptations undertaken by government agencies are usually considered to be deliberate strategies, whereas adaptations undertaken by private individuals may be a combination of both, autonomous and planned (SMITHERS & SMIT, 1997).

Concerning the timing component, SMIT & PILIFOSOVA (2001) characterize adaptations as *responsive or reactive* and *anticipatory*[18]. Human systems may undertake both types of temporal adaptations whereas natural systems rely on responsive adaptations (see Figure 3-3) for some examples on types of adaptation strategies). Other important components of adaptation are the scale and decision-making level. This considers different actors at multiple levels of governance, from policy makers at the global, national and local levels to farmers, business-owners and individuals (IPCC, 2001; 2014). At the local level, adaptation studies focus on the strategies that households and communities adopt in order to sustain their

[18] SMIT et al. (2000) distinguish also another temporal adaptation, the concurrent (during) adaptations.

livelihoods when facing disturbances and shocks derived from climate-related events (MORTON, 2007; OSBAHR et al., 2010; SMIT & PILIFOSOVA, 2001).

Figure 3-3: Examples of adaptation strategies

		Anticipatory	Responsive
Natural Systems			- Changes in length of growing season - Changes in ecosystem composition - Wetland migration
Human Systems	Autonomous	- Purchase of insurance - Construction of houses on stilts or high from the ground	- Changes in farm practices - Changes in insurance premiums - Purchase of air-conditioning
	Planned	- Early-warning systems - New design standards for buildings	- Compensatory payments, subsidies - Enforcement of building codes

Source: Adapted from SMIT & PILIFOSOVA (2001).

For example, MORTIMORE & ADAMS (2001) in their study of droughts in Northern Nigeria point out different strategies for adaptation, from making use of biodiversity in cultivated crops and integration of livestock into farming systems to the use of land and labour inputs in the farm.

Other studies analyse the difficulties that business organizations face to adapt to direct and indirect impacts of climate change and point out the learning process as an important adaptation strategy (see BERKHOUT et al., 2006). At the global and national scales, relevant examples of adaptations are the ones related to climate change (see IPCC, 2001; 2007; 2014).

The resilience view on adaptation puts a strong emphasis on the relationships between the different components of social-ecological systems (NELSON et al., 2007). For NELSON et al. (2007), the ability to adapt is based on three fundamental system characteristics that are: the degree to which the system is susceptible to change while still retaining structure and function, the degree to which it is capable of self-organization, and the capacity for learning, as well as depends on the available resources (p. 399). Resources include the financial capital, technology, institutions, infrastructure and social capital, to name a few (ADGER, 2000, 2003; BROOKS et al., 2005).

Similar to the climate and environmental change literature, the adaptation processes in the resilience perspective consider adjustment actions, but adds the transformation dimension when a system threshold is crossed. The adjustment actions refer to deliberate planned strategies undertaken by various actors when facing climate-related disturbances that may lead to deliberate/planned or inadvertent system transformations (NELSON et al., 2007).

Another important contribution of the resilience perspective on understanding adaptation processes is that it takes in consideration the possibility of multiple states that are inherent in complex social-ecological systems and the governance issues related to their management (BERKES et al., 2003). According to NELSON et al. (2007), the existence and understanding of multiple states increases the range of adaptations beyond just responding to system disturbances. As discussed above in the resilience section, the state of a system is the collection of values of the state variables at a particular instant in time and the state variables are the elements that define a space state (WALKER et al., 2002).

In irrigated agriculture, for example, the state variables would be water, irrigation systems and agricultural production. For a community that relies on this type of farming system, a desirable space state would then be one with higher water reliability, a functioning irrigation network and high agriculture production, and the adaptation efforts would be around managing for these system characterristics.

But, since irrigation systems are often managed and governed by multiple actors at different levels, also adaptation activities and strategies need to be performed across these lines. It is argued that adaptation measures for enhancing the resilience of socio-ecological systems are more effective when taken across scales (OLSSON, FOLKE, & BERKES, 2004).

3.5 RESEARCH HYPOTHESES

All the theories discussed above were selected based on their relevance for answering the particular research questions raised in Section 1.2.

For answering research question 1 – what are the impacts of frequent institutional changes in Albania's water sector on sustainable water governance – theories of institutional change were deemed as the most relevant. Their relevance consists in the fact that they enable us to characterise the institutions by, first, distinguishing them into formal institutions (water legislation, WUO statutes and other formal regulations) and informal institutions (arrangements that are implemented in practice at the community level). And second, they help us understand the direction and the drivers at play that enable the enforcement, emergence and/or the change of institutional arrangements related to water governance and management.

Drawing from these theories, the main hypotheses to be tested when assessing Albania's institutional changes in water sector are:

H1-1: The frequent changes in institutional arrangements imposed via top-down mechanisms are negatively impacting on the sustainable management of water resources in Albania.

H1-2: Water User Organisations exist only as formal (on paper) entity with very limited role in the governance and management of water resources.

To address research question 2 – what determines farmers' contributions – either in form of labour or financial resources – to maintenance of irrigation and drainage canals – I rely on CPR theory and collective action theory which explain how the different attributes of resource users and characteristics of the resource affect the motivation of resource users to engage in collective action.

Based on the above theories, the main hypotheses to be tested are:

H2-1: High land fragmentation caused by the land reform has a negative impact on farmers' contributions to maintenance of irrigation and drainage canals.

H2-2: Land inequalities brought about by Albania's land reform have no straightforward (an ambiguous) impact on farmers' contributions to maintenance of irrigation and drainage canals.

H2-3: Low levels of trust have a negative impact on farmers' contributions to maintenance of irrigation and drainage canals.

H2-4: Larger user groups are more likely to contribute fewer resources for maintenance of irrigation and drainage canals than smaller user groups.

H2-5: Long distance to market centres has a negative impact on farmers' contributions to maintenance of irrigation and drainage canals.

H2-6: Water scarcities have a negative impact on farmers' contributions to maintenance of irrigation and drainage canals.

H2-7: Presence of Water User Organisations has a positive impact on farmers' contributions to maintenance of irrigation and drainage canals.

Meanwhile, to address research question 3 – how do local communities adapt to floods – I make use of resilience and adaptation theories. The advantage of relying on resilience and adaptation theories is that, first, it views social and natural (ecological) systems as linked with one another and not as separate individual domains, and more importantly, it accounts for continuous changes that can happen to the structure and function of these systems, be it from socio-economic processes or climate-related factors. Therefore, the contribution of these theories for the case at hand stand in the fact that it allows us to analyse how the local social system has developed adaptation strategies based on ecological knowledge for dealing with the dynamics of the natural system in which it is located.

The main hypotheses that are drawn from these theories are:

H3-1: Local communities adopt different adaptation strategies to anticipate and respond to floods caused by climate variabilities.

H3-2: Local communities are able to self-organise when facing floods caused by climate variabilities.

The research strategy, empirical methods employed for data collection and data processing techniques that are used to answer the above questions are descrybed in the following chapter.

Chapter 4 – Methodology

While the previous chapters served to introduce the problem to be analysed and the theoretical background guiding our analysis, the chapter at hand will elaborate on the methodological approach that has been followed and the methods used for analysing the collected data. It will be divided into three main parts. Section 4.2 will discuss the main research paradigms dominating the research in social sciences. Section 4.3 will lay out the research strategy adopted in this work providing also a description of the study areas. Section 4.4 will introduce the empirical methods used for collecting and organising the data consisting of interviewing techniques such as semi-structured interviews and informal conversations, participant observation, secondary data, and data management, followed by Section 4.5 on data triangulation. Finally, Section 4.6 will detail the method of data analysis which include both qualitative and quantitative analysis.

4.1 Research paradigm

Empirical social research is characterised by a variety of approaches, which can be used to confront or support the relevant theories and models. The main paradigms that are largely used in social research are the quantitative and qualitative paradigms, which differ in their basic principles and in the role and position of theory (Punch, 2005; Stake, 1995). The quantitative paradigm is understood as following a deductive logic, derived from positivist assumptions. The main aim of the quantitative paradigm is the development of a theory that is subjected to rigorous testing (Guba & Lincoln, 1994). It involves development of clearly formulated hypotheses to explain the causal relationships between proposed variables, hypotheses testing through the collection and analysis of quantitative data, and controlling to ensure the validity of the results. These in turn lead to two distinct characteristics of quantitative research, replication and generalization. Replication involves operationalisation of concepts in quantitative terms so that the same procedure can be followed by other researchers, whereas generalization means that results need to be context-free. The most common methods used in quantitative research include questionnaires, surveys and experiments (Myers, 2009).

The qualitative paradigm follows an inductive logic, starting from observation to the construction of explanations and theories. A major characteristic of qualitative research is its naturalistic feature, meaning that it prefers to study people, things and events in their natural setting (Punch, 2005: 141). According to Miles and

HUBERMAN (1994), qualitative research is conducted through an intense and prolonged contact with a life situation, reflective of everyday life of individuals, groups, organizations and societies, where the researcher's role is to gain a holistic overview of the context under study (p. 6). In qualitative research, the structure of the design and the data is not organised in advance, but develops as the empirical work proceeds. Qualitative research is also much more eclectic in using multiple strategies and methods (PUNCH, 2005). For the qualitative researcher, the range of what can count as useful data and of ways of collecting them is much wider (CRESWELL, 2013). The data sources include participant observation, interviews and questionnaires, text and documents and personal impressions from the researcher (MYERS, 2009).

As such, an obvious basic distinction between qualitative and quantitative research is the form of data collection, analysis and presentation. While quantitative research presents statistical results represented by numerical or statistical data, qualitative research presents data as descriptive narration with words and attempts to understand phenomena in "natural settings" (DENZIN & LINCOLN, 2000). Both approaches are however not free of drawbacks. Scholars argue that qualitative approach suffers from problems of replicability and generalization, since qualitative research tend to be less structured and do not have a clear hypothesis for testing and it is largely bound by context and time specificities. Meanwhile, quantitative approach is more rigid in nature and may fail to capture some important contextual details. The main characteristics of both approaches are summarized in Table 4-1 below.

However, even the most purists of each of approach cannot say which of these methods is fundamentally better than the other. The suitability of the method needs to be guided by the context, purpose and nature of the research study in question. According to BRYMAN (2006), some researchers prefer to use a mixed approach, thereby taking advantage of the differences between quantitative and qualitative methods, and combine these two methods for use in a single research project depending on the kind of study and its methodological foundation. This can bring about an improved explanation of phenomena thereby enhancing validity and reliability of research findings (CRESWELL et al., 2006; GUBA & LINCOLN, 1994). Mixed methods can be used also for purposes of triangulation, complementarity and development (BRYMAN, 2003; PUNCH, 2005). In this research, I will also employ a combination of both qualitative and quantitative methods. Mixed methods research can permit the researcher to address more complicated research questions and collect a richer and stronger array of evidence than can be accomplished by any single method alone (YIN, 2009).

Table 4-1: Characteristics of qualitative and quantitative approaches

Approach	Qualitative	Quantitative
Research purpose	Understanding a social situation from participants' perspectives	Establish relationships between measured variables
Research methods and processes	- Inductive in nature; - Design emerges as data are collected - Hypothesis is not needed to begin research	- Deductive in nature - Procedures are established before study begins; - Hypothesis is formulated before research can begin
Researcher's role	The researcher participates and becomes immersed in the research/social setting	The researcher is ideally an objective observer who neither participates in nor influences what is being studied
Generalisability	Detailed context-based Generalizations	Universal context-free Generalizations

Source: Adapted from PUNCH (2005).

The qualitative evidences are collected by means of participant observation, in-depth interviews and utilization of secondary data sources. The quantitative approach is based on semi-structured interviews collected at the household level, which are then analysed descriptively and econometrically.

But, before going to the data analysis methods, I will elaborate on the design and process that guided the data collection procedures.

4.2 RESEARCH DESIGN AND PROCESS

The research design is the process of planning and executing a research project, from problem identification to reporting of results (MILLER, 1991), or as YIN (2009) puts it "…. a research design is an action plan for getting from *here* to *there*, where "here" may refer to the initial set of questions to be answered and "there" to some set of conclusions that make the answers" (p. 19). PUNCH (2005) considers four main ideas or problems that need to be taken into account when designing a research project; the strategy which deals with the issue of what questions to answer; the conceptual framework which refers to the conceptualization of and the relationship between things to be studied, or, put it another way, what data are relevant for the research; who or what will be studied; and what tools and procedures will be employed (p. 62-64).

4.2.1 Research process of the study

The study is based on a five-month empirical fieldwork carried out in two main phases, preceded by a two-week exploratory visit, which was carried out at the end January-beginning of February 2011. This research phase served as an exploratory opportunity for learning about the general situation of water management in Albania and for establishing contacts with key informants from various water-related entities of central and local government. Several meetings with farmers were also realized. However, before embarking on the field, country-related and theory-related literature review was carried out. This step served to determine and focus the research questions to be answered in this study. After that, each fieldwork was preceded by a preparation phase, and the subsequent fieldwork involved also evaluation and analysis of the information already collected. A summary of the research process and the corresponding activities is given in Table 4-2. The first fieldwork was conducted between October and December 2011. During this phase, an in-depth investigation was carried in Shkodra area, aiming at better understanding the communities' resilience by exploring their socio-economic and cultural base. I focus on the capacity of local communities to self-organise following the occurrence of adverse impacts caused by floods. As mentioned in earlier chapters, Shkodra region underwent severe floods for two consecutive years (December 2009-January 2010 and December 2010-January 2011) which inundated thousands of hectares of arable land and caused signify-cant damages to livestock and houses. The in-depth investigation took place in two of the most affected villages in the area of lower Shkodra that are located by Buna River banks.

Table 4-2: Research process and activities

Research process	Activity	Design Phase	Exploratory Phase	Research Phase I	Research Phase II	Write-up
Office work	Design of research project, literature review	X	X			
	Field work preparation	X	X	X		
	Review of secondary data and expert information			X	X	X
	Data processsing and analysis			X	X	X
Field work	Visit study sites		2 study areas, Shkodra and Lushnja	2 villages in Shkodra	12 villages in Shkodra and Lushnja	
Main empirical methods			Explorative interviews	In-depth interviews	Semi-structured and in-depth interviews	
Nr. Interviews*			HH – 3 EI – 3	HH – 30 EI – 10	HH – 160 EI – 10	
Timetable		05/2010-12/2010	02/2011	10/2011-12/2011	07/2013-09/2013	10/2013-01/2016

Source: Own elaboration.

Note: * HH refers to Household interviews, whereas EI refers to Expert Interviews.

To understand the resilience and adaptation of the local communities to these extreme events (floods), 30 in-depth qualitative interviews with farmers, and numerous informal conversations were conducted. The respondents were selected on a random-basis, by showing up at farmers' homes, in the streets and village bars. Expert information was collected from representatives of local, regional and central administrations, members from the local council of elderly, as well as the priests of both villages, making a total of 10 in-depth interviews. Additional information was obtained through informal conversations, which provided a crucial mean sfor going deep into more sensitive issues which otherwise was not possible in a more formalized setting. Secondary data on Albania's climate indicators, climate change scenarios and their impacts were also utilized. The second research phase aimed at exploring the determinants that may impact the motivation of farmers to contribute to maintenance of irrigation and drainage canals. This phase was carried out in the two districts, Shkodra and Lushnja. In these two districts, four study sites were identified and selected.

Each site represents also an irrigation-catchment area, covering primary, secondary and tertiary canals. In each site, 3 villages (12 in total) have been selected, one at the head-end of the irrigation system, one at the middle and one at the tail-end, so that resource scarcities and issues of water allocation are considered. The identification of villages to be selected for the research has been done in consultation with specialists from regional offices of Agricultural Departments and Drainage Boards of respective districts. The same line of reasoning was applied to the governance of the systems. In each district, one site with formal and de facto local management powers (Water User Organizations) and one site where the government is formally responsible for the management has been selected, so that effects of governance differences are captured. Meanwhile, within each of the 12 villages, about 15 farm household interviews per village have been conducted. The size of the villages averages 329 farm households[19].

For identifying the attributes that motivate farmers to contribute or not for the maintenance of irrigation and drainage canals, data were collected at the farm household level supplemented by secondary data, as well as from other sources acting as key informants consisting of village heads, agronomists from the local level government, water user association representatives, experts from the irrigation and drainage authority, as well as from experts from Ministry of Agriculture and Ministry of Environment. The survey was carried out within a two-month fieldwork period (mid-July to mid-September 2013); where about 160 farm households were interviewed[20]. The farm households were chosen randomly, by just showing up at their farms, at home, in the village roads as well as in bars. The data gathered consists of farm household's demographic, social and economic characteristics, size of land endowments and the number of plots, land title and perceived land security. For the purpose of this study the most relevant data are information on contributions to maintenance of irrigation and drainage canals either monetary or in form of labour. Information has also been collected on perceptions over the condition of the irrigation systems, community contribution, social trust and membership on any form of organizations operating in the community (excluding political parties). Data were collected taking into account socio-economic attributes of the communities, physical characteristics of the resource,

[19] These figures are given by official local authorities. There are numerous cases of more than one household living under the same roof, thereby operating only one farm.

[20] Due to missing data, only 150 interviews are used for the econometric analysis.

and institutional aspects shaping the interactions related to management of irrigation systems. Secondary data included information on size of communities covered by each irrigation system in terms of total agricultural land and irrigated agricultural land, number of villages, as well as on crop composition planted in the area. At the expert level, data collected include information on the response-bilities for maintenance of irrigation and drainage systems or part of it and water delivery. This includes information on fees for irrigation and/or maintenance to be paid by farmers or water users associations, functioning of water user associations and monitoring, sanctioning and conflict resolution mechanisms.

As discussed earlier in the section, the choice of the most relevant research approach and strategy to answer the questions set forth by the researcher depends on the purpose and nature of the research. One of the common methods broadly used for analysing natural resource management are case studies.

4.2.2 Case studies

Case studies are qualitative, empirical research strategies that allow the investigation of complex phenomena within their real-life context (DENSCOMBE, 2007: 35). They can be designed in various ways to serve many different purposes. For PUNCH (2005), a case study is a "bounded systems", where the researcher needs to identify and describe the boundaries of the case in the clearest manner possible, as well as to make the logic and the strategy clear since this is important also for identifying the unit of analysis (p. 145). YIN (2009: 14) argues that case studies can be based on any mixture of qualitative and quantitative evidence, which according to BAXTER and JACK (2008) facilitates reaching a holistic understanding of the phenomenon being studied. Besides using sociological and anthropological field methods such as observations, interviews and narrative reports, case studies may also use quantitative strategies such as questionnaires tailored especially for small-scale surveys.

YIN (2009) categorises case studies as explanatory, exploratory, or descriptive[21]. Explanatory case study would be used if the researcher were seeking to explain the presumed causal links in real-life situations that are too complex for the survey or experimental strategies. Exploratory case studies are used to explore those situations in which there is no clear, single set of outcomes from a particular event or intervention; whereas descriptive case studies are used to describe a phenomenon and the real-life context in which it occurred.

[21] STAKE (1995) makes a different distinction of case studies. They consist of (a) intrinsic case study, which allows the researcher to have an understanding of the particular case of interest (b) the instrumental case study, where a particular case is examined to give insights into an issue, or to refine a theory, and (c) the collective case study, which is an extension of the instrumental case study covering several cases with the objective to learn more about the phenomenon or the general condition.

YIN (2009) has further differentiated case study designs in multiple-case study versus single-case study that hold either holistic or embedded characteristic. A multiple case study contains more than one study case and is well suited for comparison between different cases, which is often thought of generating more convincing evidences. The logic behind the use of multiple-case studies is based on replication. According to YIN (2009), "each case must be selected carefully so that it either (a) predicts similar results (literal replication) or (b) predicts contrasting results but for anticipatable reasons (theoretical replication)" (p. 54).

Meanwhile, a single-case study is well suited for a more in-depth analysis of a *critical* case, which can be confronted against the theoretical prescriptions, by either extending or opposing them; of *unique* case (an event or a phenomenon is rare and unique); of a *typical* case (here the goal is to capture the conditions and circumstances of a common situation that occurs in everyday life); of a *revelatory* case (the researcher observes a phenomenon or event that may have previously been inaccessible for investigation), and of *longitudinal* case (studying the same case at more than one points in time) (YIN, 2009: 46-49).

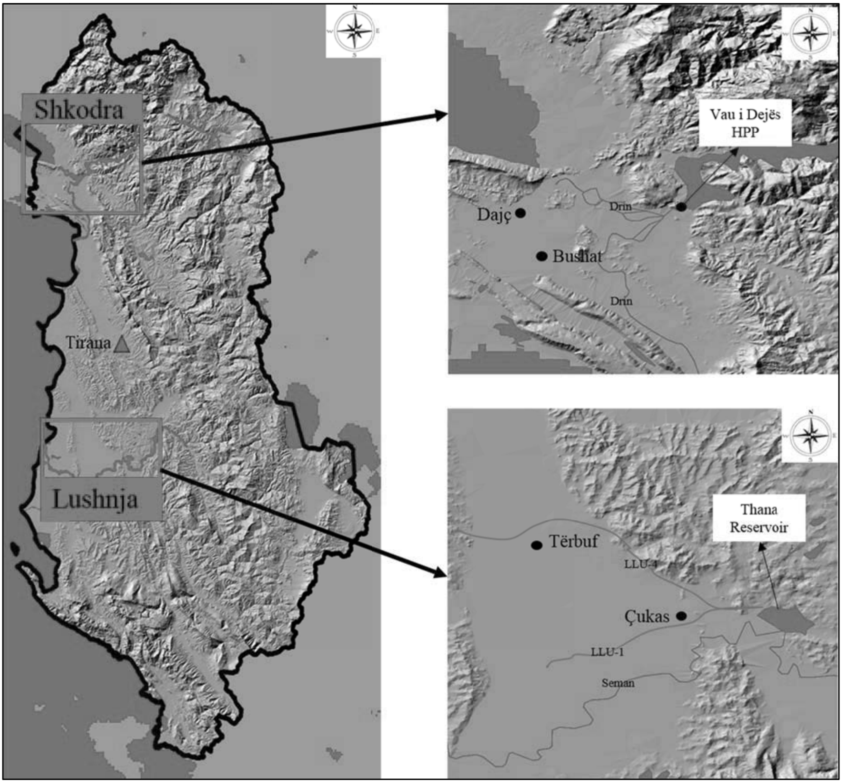
Single-case studies with holistic or embedded characteristics differ between each other in that the embedded case involves more than one unit of analysis. An example of an embedded single-case study may be studying a water organization that consists of several local water entities. In this case, the researcher may want to investigate the organization as a whole and also pay particular attention on one of the local water entities selected through sampling techniques. According to YIN (2009), the ability to look at sub-units that are situated within a larger case is powerful when you consider that data can be analysed within the subunits separately.

Having these characteristics in mind, this study adopts an *exploratory embedded case study approach*. The overarching theme is the governance of water resources in Albania where the focus will be primarily put on management of irrigation systems. At the same time, the study seeks to explore another sub-issue such as the resilience of local communities in the face of unexpected adverse impacts like floods.

4.2.3 Description of case study sites

In the two selected regions, Shkodra and Lushnja (see Figure 4-1) agriculture is an important economic activity for securing livelihoods for rural people and therefore water management (irrigation and drainage) is crucial for achieving high agricultural production. Based on climate characteristics and climate change predicttions, these areas are likely to face water challenges in the future. Lushnja region is located in the western plain and is one of the most agriculture-oriented regions in Albania. Shkodra is another important agriculture-oriented region whose development relies largely to the performance of irrigation and especially drainage networks. It is located in the north-western part of the country where the major hydro power plants are also located. For two years in a row, this region has been flooded several times destroying almost all agriculture production and caused several damages on livestock. The rationale for choosing these two areas is two-fold: First, both need irrigation in summer time, due to hot and dry Mediterranean climate. Albania's annual average temperatures are variable, ranging from 7°C in mountainous zones to 15°C in low Western plains where both areas are located. Annual rainfall varies from 600 to 2,000 mm in coastal areas to 1,600 to 2,000 mm in the hilly regions and up to 3,000 mm in the mountains.

Figure 4-1: Map of study areas



Source: Author.

Around 70 % of the rainfalls within the period (October-March), where the month with most of the rainfall is November, while the months with the least rainfall are July and August (BRUÇI et al., 2008). This makes both irrigation and drainage important, not only for our case study areas but for the country as a whole. And second, both are among the most agriculture-oriented and productive areas of the country. The main characteristics of both study areas are summarised in Table 4-3.

Shkodra region has another specific characteristic. As mentioned before, Shkodra region is characterised by historical occurrence of floods, since this region is traversed by three important rivers; Drin River (the largest river in the country, which flows from Lake Ohrid), Buna River which discharges Lake Shkodra and Kir River. All these rivers belong to the Drin-Buna River Basin[22].

In the early 1970s, three huge dams that served mostly for energy production and flood protection were constructed on Drin River. This had an impact on the hydrological, hydraulic and sediment regime of the river, changing it to a considerable extent (Meçaj, 2003). In 2012, a forth hydropower plant (Ashta HPP) has been constructed downstream of Vau i Dejës HPP, impacting even further the hydrological context of the area. A more detailed description of the hydrographical characteristics of Shkodra region will be provided in Section 5.2.1.

[22] Following the requirements of the Water Framework Directive of the European Council which requires that water resources are managed on hydrological basis, Albania has divided the administration of its water resources into six river basins, where Drin-Buna is the largest in the country.

Table 4-3: Key characteristics of study areas

Study areas	Village	Agri-system	Irrigation method	Spatial location	Water Source	Water Gover-nance	Climate risks
Bushat	B1	Mixed and Intensive	Gravity	Head-end	Vau i Dejës HPP	WUO	Drought
	B2	Mixed and Intensive	Gravity	Middle	Vau i Dejës HPP	WUO	Drought
	B3	Mixed and Intensive	Gravity	Tail-end	Vau i Dejës HPP	WUO	Drought and floods
Dajç	D1	Mixed and Intensive	Gravity and Pumped	Head-end	Vau i Dejës HPP & Buna River	Governm ent (DB)	Floods and Drought
	D2	Mixed and Intensive	Gravity and Pumped	Middle	Buna River	Governm ent (DB)	Floods and Drought
	D3	Mixed and Intensive	Gravity and Pumped	Tail-end	Buna River	Governm ent (DB)	Floods and Drought
Çukas	Ç1	Mixed and Intensive	Gravity	Head-end	Thana Reservoir	WUO	Drought
	Ç2	Mixed and Intensive	Gravity	Middle	Thana Reservoir	WUO	Drought
	Ç3	Mixed and Intensive	Gravity	Tail-end	Thana Reservoir	WUO	Drought
Tërbuf	T1	Mixed and Intensive	Gravity	Head-end	Thana Reservoir & Kasharaj Reservoir	Governm ent (DB)	Drought
	T2	Mixed and Intensive	Gravity	Middle	Thana Reservoir & Kasharaj Reservoir	Governm ent (DB)	Floods and Drought
	T3	Mixed and Intensive	Gravity	Tail-end	Thana Reservoir &Kasharaj Reservoir	Govern-ment (DB)	Drought and Floods

Source: Own elaboration.

Additionally to the general characteristics of both regions, more specific information on the areas where the data was collected will be given in the following sub-sections. Sub-sections 4.2.3.1 and 4.2.3.2 correspond to study areas in Shkodra region, whereas sub-sections 4.2.3.3 and 4.2.3.4 to Lushnja region.

4.2.3.1 Bushat study area

Bushat study area is located in north-western Albania, about 12 km from the city of Shkoder. It is also a local administrative unit (Bushat Commune) consisting of 14 villages with about 25.000 inhabitants, and which covers a territory of 100 km^2. The main income source in the area is agriculture, livestock farming, remittances, and other off-farm activities such as construction and services. Total agriculture land is about 6.500 ha out of each, about 4.500 ha are irrigable by gravity or drainage pumped water. Village B1 is located at the head-end of the irrigation system, and covers a surface of 436 ha of agricultural land. As can be seen in Table 4-4, vegetables and fodder crops for livestock (forage and maize) occupy the largest share of agricultural land. Village B2 is located in the middle of the irrigation systems, and covers a surface of 613 ha of agricultural land. Also here the major crops are forages (alfalfa), vegetables and maize.

Table 4-4: Crop structure in Bushat study area

	Village B1	Village B2	Village B3
Area	436	613	184
Wheat	25	35	10
Maize	110	200	30
Alfalfa	136	231	109
Vegetables	124	88	19
Beans	9	18	8
Fruits	17	20	1
Vineyards	2	3	1
Potatoes	1	3	1
Decorative Trees	0	0	0
Fallow	12	15	5

Source: Shkodra Regional Agricultural Directorate (year 2013).

Note: The area with vegetables is calculated together with watermelon. Figures are in ha.

Village B3 is located at the tail-end of the irrigation systems, covering an area of 184 hectares. Here, alfalfa occupies the major share of agricultural land, followed by maize and vegetables.

The general irrigation method in the study area is by gravity. The irrigation water is supplied from Drin River, after the newly constructed Ashta HPP, located below Vau i Dejës HPP (one of the three main hydropower plants constructed on Drin River). About 1.100 ha of gravity irrigation have secondary canals that supply water only within the territory of commune, the other part of the irrigation system is shared with the neighbouring communes. The primary canal is 4.2 km long, lined with concrete and in good shape. Also, 10.8 km of secondary canals are considered as primary canals. The rest of secondary canals have a total length of 23 km. Meanwhile, drainage system is composed of 113 km of primary and secondary canals. The irrigation and drainage network have been transferred to Bushat Water User Organization, which is responsible for operation and maintenance of the entire system.

4.2.3.2 Dajç (Bregu i Bunës) study area

Dajç (Bregu i Bunës) study area has a total population of over 8,600 inhabitants, distributed in 11 villages. The main economic activity of the area is agriculture. The Commune covers a territory of about 3,652 ha, of which 3,383 ha are agricultural land, about 190 ha are pastures and 79 ha are urban land. Village D1 is located at the head-end of the system, covering a surface 201 ha. As shown in Table 4-5, the major crops planted are alfalfa and maize. Village D2 is located in the middle of the irrigation system and covers an area of 389 ha of agricultural land. Also here, the dominant crops are alfalfa and maize. An additional crop planted in this village (but not only) is decorative trees. According to officials from the commune, planting of decorative trees has become an attractive business for several years now, since most of the products are sold in the farm through prearranged agreements with traders. Village D3 is located at the tail-end of the system, covering a surface of 190 ha of agricultural land. Also in this village, the same crop patterns can be noticed, dominated by alfalfa and maize. In the whole Dajç area, most of the agricultural land is of very good quality and thus provides for highly qualitative products. The main economic activities of the area are agriculture and services. In terms of agriculture, the sector is dominated by livestock and crop productions and to a lesser extent by fishing, since many of the villages are located by the banks of Buna River. Buna River is one of the most important natural resources of the area, having traditionally served also as a source for irrigation of agricultural land. However, although Dajç area has a complete system of drainage and irrigation, most of these networks are in poor condition due to lack of maintenance and as a result they have started growing vegetation which hinders the free flow of the waters (Dajç Commune, 2008). The irrigation and drainage infrastructure has not been transferred to any locally-organised water user or farmer groups, but they are officially under the responsibility of government agencies, which in this case is the Shkodra Drainage Board.

Table 4-5: Crop structure in Dajç study area

	Village D1	Village D2	Village D3
Area	201	389	190
Wheat	1	3	1
Maize	60	103	25
Alfalfa	123	187	115
Vegetables	11	30	10
Beans	4	9	4
Fruits	1	0.5	2
Vineyards	0	0.5	2
Potatoes	1	1	1
Decorative Trees	0	5	0
Fallow	0	50	30

Source: SHKODRA REGIONAL AGRICULTURAL DIRECTORATE (Year 2013).

Note: The area with vegetables is calculated together with watermelon. Figures are in ha.

Besides irrigation and drainage systems, also parts of riverbanks along Buna River have suffered from lack of maintenance, which together with malfunctionning of the drainage system are the main causes of flooding in a big part of agricultural land in the Commune of Dajç. Inundations have occurred frequently, but to varying degrees. The recent ones have caused considerable damage to crops and sometimes also to residential buildings.

4.2.3.3 Çukas study area

For Lushnja region, the selection of the study areas represents a more complex view given that the villages chosen for carrying out the research are part of different communes. These villages do however share the same irrigation and drainage infrastructure, which is the rationale behind their selection. The Village C1 is part of Allkaj Commune, about 12 km south of the city of Lushnja, and it is situated at the head-end of the irrigation system. The main income source is agriculture mostly field crops but also vineyard, apple trees, live-stock farming, remittances from emigrants, and some small scale family agro industry. The agriculture land in Village C1 is 190 ha. Village C2, on the other hand, is under the responsebility of Krutje Commune and has an agriculture land of 200 ha where also agriculture is also the main source of incomes. Meanwhile, Village C3 is under the responsibility of Bubullimë Commune with an agriculture land of 210 ha. Also in this village, farmers rely mostly on agriculture for their livelihoods. A summary of the main crops and the respective planted area is shown in Table 4-6.

Table 4-6: Crop structure in Çukas study area

	Village C1	Village C2	Village C3
Area	190	200	210
Wheat	34	37	52
Maize	38	41	33
Alfalfa	72.5	91.9	0
Vegetables	7.2	20	30
Beans	1.6	0	0
Fruits	6	6.5	7
Vineyards	26	0	14
Greenhouse	4.7	3.6	0.9
Decorative Trees	0	5	0
Fallow	0	0	0

Source: ÇUKAS WATER USER ORGANIZATION.

Note: Figures are in ha.

The irrigation in this area is performed via gravity method. The main water source for irrigation comes from Thana Reservoir, through main canal LUU-1. Thana Reservoir has a projected capacity of 58 million m^3, but due to alluviums its actual capacity is 54-56 million m^3 of water. The irrigated area is 4446 ha which are served by Çukas Water User Organization. The irrigation system consists of 17 km of primary canal, about 79 km of secondary and about 370 km of tertiary canals. This system serves 17 villages, belonging to 4 different local government units.

4.2.3.4 Tërbuf study area

Tërbuf plain is an important agricultural area, located in the north-western part of Lushnja district. It covers an agricultural area of 8200 ha. This surface is shared between different administrative units that are all part of Lushnja region. Until 1960s, Tërbuf plain was marshland, but massive investments in drainage systems and other reclamation measures carried out by the communist government transformed it into a fertile agricultural area. The first study village (Village T1) is located at the head-end of the irrigation system serving this area. As shown in Table 4-7, it covers 385 ha, which are mainly planted with wheat, maize and alfalfa.

Table 4-7: Crop structure in Tërbuf area

	Village T1	Village T2	Village T3
Area	385	360	350
Wheat	138	141	105
Maize	46	101	30
Alfalfa	62	81	140
Vegetables	11	12	1.7
Beans	0	0	0
Fruits	7	6	5
Vineyards	0	0	0
Greenhouse	0	0	0
Decorative Trees	0	5	0
Fallow	121	19	68.3

Source: Lushnja Drainage Board and Lushnja Regional Agricultural Directorate.

Note: Figures are in ha.

Village T2 is located in the middle of the system and covers 360 ha of agricultural land. Also in this case, the crop structure is dominated by wheat, maize and alfalfa. The same cropping patterns are dominant also in Village T3, which is located at the tail-end of the system and covers a surface of 350 ha. Given the dry and hot summer that characterises the study area, irrigation is very important for increasing agricultural production.

As in the other case, the water for irrigation comes primarily from Thana Reservoir via a 22 km long primary canal with a capacity of 2m^3/second, and supplemented by waters coming from Kasharaj Reservoir. The latter water source is used when there are shortages of water in Thana Reservoir.

On the other hand, also drainage services are highly important, given the marshy characteristics of the area. Both irrigation and drainage infrastructure are officially under the responsibility of government agencies, namely Lushnja Drainage Board. Meanwhile, the conditions of the systems are rather poor since only about 20 % of the area is currently irrigated.

4.3 Methods of data collection

In this study, I will rely on interviews, participant observation, informal conversations, and on reviewing various types of documents and archival records as methods for collecting the data. The relevance of these data collection methods for the present study will be discussed subsequently.

4.3.1 Interviews

Interviews differ from conversations in the way that they "involve a series of assumptions and understandings about the situation which are not normally associated with a casual conversation" (DENSCOMBE, 2007: 173). There are different types of interview patterns that are used in empirical social research. They can be structured-interviews, unstructured interviews and semi-structured interviews. Structured interviews are based upon standardized pre-established questions with pre-set categories. This type of interviews allows little room for flexibility (PUNCH, 2005). At the opposite side of structured interviews are the unstructured interviews. The most common types of unstructured interviews are open-ended, non-standardized and in-depth interviews, known often as ethnographic interviews (PUNCH, 2005). With this type of interviews, the researcher poses some open-ended questions and the interviewee expresses his/her own opinion freely. The direction of the interview is determined by both the interviewee and interviewer, which provides a considerable degree of flexibility derived from lack of predetermined structure. Meanwhile, semi-structured interviews differ from other types due to the fact that it contains flexibility and structure simultaneously, which can also be considered a powerful advantage. The interviewer maintains the list of topics and questions to be asked, while he can simultaneously remain flexible in terms of the order in which the issues are considered. Moreover, semi-structured interviews allow the interviewee to speak more broadly on issues raised by the researcher (DENSCOMBE, 2007: 176). Which of these types of interviews should be used depends on the research design and strategy. As PUNCH (2005) suggests "the type of interview selected should be aligned with the strategy, purpose and research question" (p. 170). For the purpose of this study, semi-structured and in-depth interviews have been used. The semi-structured interviews have been used to collected information on issues concerning maintenance of irrigation and drainage canals, whereas in-depth interviews have been used to explore the social resilience and self-organization mechanism in the flooded communities.

Figure 4-2: Interviewing process

Source: Photo taken by Artur Frroku.

Semi-structured interviews have been conducted at the household level, where more than half of the 160 semi-structured household interviews have been conducted by myself and the rest by two well-trained assistants. Before starting the fieldwork, some test interviews were conducted with farmers in villages around Tirana with the purpose of checking whether questions are relevant for the Albanian context and if the formulation of the questions is comprehensive for respondents.

The questionnaire testing served also as training process for the two assistants.

The in-depth interviews have been used for collecting information at the household level and from key informants at the local, regional and central level. For both types of interviews, the information has been recorded by using the pen and paper method.

4.3.2 Participant observation

Observation is another way of collecting qualitative data without relying on what people say. It relies on the experiences witnessed by the researcher and helps understanding what actually happens in that specific environment (DENSCOMBE, 2007: 206). The researcher can be either "a passive" observer or an "active" one (PATTON, 2002). However, in both cases he/she is involved in the daily routine of the community. One of the common observation method widely used in social sciences especially for ethnographic and anthropological research is participant observation. BECKER and GEER (1957) provide an interesting account what is meant by participant observation. "Participant observation is method in which the observer participates in the daily life of the people under study, either openly in the role of researcher or covertly in some disguised role, observing things that happen, listening to what is said and questioning people over some length of time" (BECKER and GEER, 1957: 28). It usually takes place in many situations of villagers' everyday lives. In this study, participant observation has consisted mainly in observing land use practices performed by farmers, as well as during irrigation activities. This method was particularly useful to understand the water allocation process and observe resulting water scarcities across the system.

4.3.3 Informal conversations

Informal conversation was another communicative technique that proved to be fruitful to the case study. This technique is very similar to unstructured interviews. The difference is that the latter will always retain a somewhat "official" atmosphere, whereas the informal conversation should be perceived as if happening by chance (YIN, 2009). The communication remains largely spontaneous, and thus creates different feelings and expectations among the actors involved. Especially in cases where actors are reluctant to be "officially" questioned this may in fact turn out to be an alternative way to access data. In this study, most of the informal conversations were conducted with farmers and key experts in the flooded areas. This method of data collection appeared crucial for gathering information related to floods due to the sensitivity of the issue. Key experts especially were reluctant to reveal much information in an official way. Some of these conversations took place by the farmers' fields and most of them during evenings when farmers were gathering after work in the village bar. Informal conversations were used also during the second research phase during talks with farmers and members of the WUOs (water guards, head of WUO) while observing the process of water allocation for irrigation. The main issues revealed during informal conversations were later entered in fieldwork's notes. The information collected from this method is mainly used as background information for understanding the relationships within the community and between the community and local water user organisation, as well as to detail the description of different adaptation strategies to floods undertaken by the community and higher-level governance structures.

4.3.4 Secondary data

Documents such as government texts, statutes of Water User Associations/ Organizations, and other relevant data are obtained from the central, regional and local administration. This allowed for reviewing the relevant institutional framework and to investigate possible discrepancies within the formal institutions and between formal rules and rules-in-use.

4.3.5 Data management

Data management is an important and vital process of the research. MILES and HUBERMAN (1994) consider data management as necessary for facilitating the coherence of a research project. That involves planning from the outset of the project to storing the collected data, c ategorizing, summarizing, analysing, and finally communicate the findings to readers. The data base of the study at hand consists of the questionnaires completed by hand, field notes and diaries, other relevant secondary materials and photo documentation. The stored data has been arranged based on field work phases and then classified according to study areas.

The semi-structured questionnaires have been first transcribed into Excel and then exported to STATA 13 data file. The output has been saved in do-and log-files so that they can be retrieved for later use. Also the in-depth interviews and field notes containing informal conversations and observations have first been transcribed into a Word document and then categorised based on the specific theoretical issues that are aimed to be explored.

4.4 METHODOLOGICAL TRIANGULATION

In social research, triangulation is defined as "the combination of methodologies that study the same phenomenon" (DENZIN, 1978: 291). It involves the use of multiple methods in order to enhance confidence and validity of the research (BLAIKIE, 2000; BRYMAN, 2011; YIN, 2009). Methodological triangulation is the most commonly used type of triangulation. DENZIN (1978) distinguishes two types of methodological triangulation; between- and within-method type of methodological triangulation. The "between-method triangulation" involves combining both qualitative and quantitative methods in studying a single phenomenon, with the aim of achieving convergent validity (JICK, 1979). On the other hand the "within-method triangulation" involves crosschecking for internal consistency (DENZIN, 1978).

Methodological triangulation is however not the only type of triangulation. The other triangulation forms are: data triangulation, which entails gathering data through several sampling strategies so that time, space and people are taken into account when gathering data; theoretical triangulation, which refers to the use of multiple theories in interpreting data; and investigator triangulation, which refers to the use of more than one researcher in the same study to gather and interpret data (DENZIN, 1970 cited in BRYMAN, 2011).

This study does not make use of all the mentioned triangulation types but considers only the methodological and data triangulation. The methodological traingulation consisted in combining the qualitative and quantitative approach, which were elaborated in the preceding subsections. Meanwhile, data triangulation is achieved by using multiple sources of data such as semi-structured interviews, in-depth interviews, participant observation and informal conversations with secondary data and expert interviews. The use of multiple data sources and methods help the researcher to gather multiple perspectives on the same issue so as to gain a more complete understanding of the phenomena that will be analysed (YIN, 2009).

4.5 ANALYTICAL METHODS

The diversity of research approaches and methods in social sciences implies that also data analysis is diverse. Qualitative approach adopts a more case-oriented analysis, focusing on the local context and lived experiences, whereas the quantitative approach conceptualizes reality in terms of variables and relationships between them (PUNCH, 2005: 237-8). Qualitative analysis provides a holistic view of the case and allows for greater scrutiny, whereas quantitative is good for finding probabilistic relationships among the variables, but have some drawbacks in terms of explaining causal complexities (MILES & HUBERMAN, 1994: 435). Another distinct difference between qualitative and quantitative approaches is that the former relies on *texts* for analysing the data whereas the latter on *numbers*. The *text* that qualitative researchers analyse is most often transcripts of interviews or notes from participant observation (PATTON, 2002). These in turn are codified and categorised based on themes and common patterns. Meanwhile *numbers* that quantitative researchers use, serve for measurements, which in turn require pre-structuring of the data. Quantitative data can be derived from semi-structured interviews or other standardized questionnaires.

Since this study uses a mixed methodological approach by combining qualitative and quantitative methods, the data analysis has been performed along these lines.

4.5.1 Qualitative analytical methods

PUNCH (2005: 194) points out that there is no single right way and no single methodological framework to do qualitative data analysis. Since the qualitative data involve a bulk of detailed information on contextual dimensions and peoples' perception derived from the data collection methods mentioned above (interviews, participant observation and so on), analysing them requires some form systematic organization so that it allows to link the different procedures of research design from research questions to drawing valid conclusions. MILES and HUBERMAN (1994) have identified three components that comprise an interactive model of data analysis: data reduction, data display and conclusion drawing and verification.

Data reduction refers to selection, focusing, simplification, abstraction and transformation of data that appear in the field notes or transcriptions. It is a continuous process that occurs even before collecting the data and continues until the final report is completed (MILES & HUBERMAN, 1994). Data reduction is a form of analysis that sorts and organises data enabling the drawing and verification of final conclusions.

This component involves coding and categorisation. According to PUNCH (2005), coding is the starting activity of qualitative analysis and serves as basis for what is to follow (p. 199). Codes are labels or names against pieces of data and serve for different purposes; from attaching meaning to a particular piece of data to more abstract functions such as categorizing by identifying patterns and organising themes. At the same time, they provide a basis for storage and retrieval for later use, as well as entail some system of categorizing the collected data so that the researcher can easily and quickly find, retrieve and group them related to the research question, hypothesis, or theme (MILES & HUBERMAN, 1994: 57). Codes can be descriptive, interpretative and pattern coding. Descriptive codes entail little interpretation and as the researcher moves deeper into the analysis, more interpretative and explanatory values can be given to the analysed text.

Data display is the second component of data analysis in qualitative research. Data display refers to the organised and compressed assembly of information that allows the researcher to draw conclusions (MILES & HUBERMAN, 1994: 11). Some common data display forms include tables, matrixes, graphs, charts and networks, which facilitate drawing of conclusions and/or move on with further analysis.

In this study, I mostly rely on graphs, charts, tables and matrixes for displaying the analysed data. Graphs have been used to show the variabilities in water flows in HPP Vau i Dejës, whereas charts have mostly been used to show the changes in crop structures in the flooded areas.

Meanwhile, tables and matrixes have been used more extensively throughout the work. Tables have been used to display descriptive statistics, regression results and correlations between different variables especially related to contributions for maintenance of canals at different levels.

Matrixes, on the other hand, have been used to organise information related to responsive adaptation strategies and actions that farmers undertook during floods and to anticipatory measures to deal with possible upcoming floods.

These instruments of data displaying facilitate the interpretation and explanation of actions and/or phenomena and would allow the researcher to answer study's research questions and draw conclusions.

Conclusion drawing and verification is the third component of data analysis. Conclusion drawing is a process that evolves with data collection, since the researcher starts drawing conclusions since the beginning of the data collection. While the conclusions at this stage may be open and vague, they are sharpened and become explicit as the analysis progresses. Nevertheless, for the conclusions to be plausible and hold validity, verification of the conclusions is also important. Conclusion verification implies that the researcher may need to go back once in a while to field notes. That means that conclusion drawing is a continuous process which is generated throughout different phases of the research. MILES and HUBERMAN (1994) have identified and listed a number of tactics that are important for achieving meaningful, reliable and valid conclusions. These tactics involve noting common patterns and themes, clustering and contrasting to finally *building a logical connection of evidences* that show theoretical and conceptual coherence. Building a logical connection of evidences means that different independent sources of evidence need to indicate the causal links that point to a certain outcome, and that evidential relationships have to make sense so that a logical basis for a particular claim is well founded. For the latter to hold, it means that the empirical evidence is linked to an overarching theoretical basis which explains how and why the studied phenomena occur.

4.5.2 Quantitative data analysis

As mentioned earlier, this study employs a combination of qualitative and quantitative approaches. While the qualitative analysis is used mostly to undertake an in-depth investigation of contextual (cultural, socio-economic and political) dimensions that may affect farmers' self-organization opportunities, as well as to analyse the impact of post-communism institutional changes in land tenure and water management, quantitative analysis is used to econometrically analyse the likelihood of farmers to collectively contribute to maintenance of irrigation and drainage canals. More precisely, I will analyse financial and labour contributions of farmers to canal cleaning and maintenance. There are different econometric models – with linear and non-linear functional forms – that can be used for analysing the data. The model used for the econometric analysis in this study is the logit model. Together with Ordinary Least Squares (OLS), logit model analysis is one of the most popular econometric procedures used in social sciences (CAMERON & TRIVEDI, 2005). The logit model was considered most relevant for the case at hand because of the nature and distribution of the data, especially of the dependent variable which is of a binary nature with values ranging (0,1). With respect to using linear models such as OLS, they might be inappropriate since they are likely to violate the assumptions of normal distribution and homogenous error variance. Also predicted values may be beyond the range (0,1) (POHLMANN & LEITNER, 2003). That indicates that logit models represent some advantages in that it allows properties of a linear regression model to be exploited, the logit itself can take values between $-\infty$ and $+\infty$, and the probability remains constrained between 0 and 1 (POHLMANN & LEITNER, 2003).

Additional to regression analysis, I use also nonparametric statistical tests to analyse differences in frequencies of responses related to perceptions of respondents on conditions of irrigation and drainage canals, as well as on perceptions over the responsible authority in charge of maintain irrigation and drainage canals. The differences to be tested related to the form of governance, i.e. whether the respondents are part of WUO or otherwise, and regional differences between Shkodra and Lushnja. The non-parametric test used for this purpose is Kruskal-Wallis H-Test. The Kruskal-Wallis test it is the non-parametric version of ANOVA and a generalized form of the Mann-Whitney test method since it permits testing of 2 or more groups. It can be used to determine if there are statistically significant differences between two or more groups of an independent variable on a continuous or ordinal dependent variable, indicating if the frequencies are equally based on calculated ranks (KRUSKAL & WALLIS, 1952).

4.5.2.1 Non-linear regressions

As noted above, logit model is one of the most frequent used nonlinear models for performing econometric analysis when the dependent variables are of binary nature (WINKELMANN & BOES, 2006). Logit model estimates the probabilities of an outcome, with values of (Y=1) representing the occurrence of an event and (Y=0) its absence. To put it in the study context, (Y=1) represents the occurrence of contributions either financial or with labour, and (Y=0) means that farmers do not contribute. The probability of the logit model is expressed as a function of socio-economic, physical and institutional factors that may have an impact on contributions. It is written as:

$$logit(\pi) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \dots . + \beta_k x_k \qquad (1\text{-}1)$$

Where logit (π) denotes the log of the odds for probability of a "success" outcome, which in our case is contribution to canal cleaning and maintenance, either financially or with labour. Meanwhile, the βs represent the changes in log odds of contribution to a unit change in Xs which are the covariates. The logit model says that the response variables Y are independent given the covariates X (WINKELMANN & BOES, 2006: 102).

Logit models are similar to probit models since both models operate based on binary outcomes. However, they differ in the link function since the logit model uses a logistic distribution (Λ) whereas the probit model uses the standard normal distribution (Φ).

Logit function: $$Pr(Y = 1|X) = \frac{e^{x'\beta}}{1+e^{x'\beta}} = \Lambda(x'\beta) \qquad (1\text{-}2)$$

Probit function $$\Pr(Y = 1|X) = \Phi(X'\beta) \qquad (1\text{-}3)$$

Putting it in a visualized way, it means that the logit model has slightly flatter tails and larger variance than probit models (WINKELMANN & BOES, 2006: 103). The logistic distribution tends to give larger probabilities to Y=1 when $(x'\beta)$ is very small, and smaller probabilities to Y=1 when $(x'\beta)$ is very large (GREENE, 2012: 729).

Another difference can be noticed also in the interpretation of the results. However, choosing between the models does not have a straightforward procedure. A strategy to choose between the models is to look at the likelihood value and/or Akaike Information Criterion (AIC) value (BURNHAM & ANDERSON, 2002). But, the results of both models show that the likelihood and the AIC values from logit model are slightly smaller for financial contributions and slightly higher for labour contributions. Also, when we look at the regression output, the values of the estimated coefficients for both models are very close.

In logit models, tests of significance for the estimated coefficients are commonly performed with Wald X^2 statistic which is based on the change in likelihood function when an independent variable is added to the model (MENARD, 1995). In the econometric application I use the "logit" command implemented in STATA 13 for estimating the logit models. In order to account for village differences and allow for intragroup correlation between the variables without affecting the estimated coefficients, the standard errors are clustered by village, using the vce(cluster) command.

4.5.2.2 Logit-Model Robustness Tests

In order to check for the fit of the model and robustness of the results several tests are performed. First, I check for the correct specification of the dependent variables. If the model is specified correctly, i.e. the dependent variable on the prediction and the prediction squared, the prediction squared would have no explanatory power. After that, I run several postestimation tests to estimate model specification and the goodness-of-fit of the models, such as likelihood ratio test, Pearson chi-square and Hosmer-Lemeshow's group based estimation. Likelihood ratio test involves estimating two models and comparing them via maximum likelihood estimation, under the null hypothesis that the parameter vectors are constrained to zero. A practical way to restrain the model is to remove variables from the equation. If the difference between the models is statistically significant, then the less restrictive model (the one with more variables) is said to fit the data significantly better than the more restrictive model (GREENE, 2012: 744). The likelihood ratio statistic is:

$$LR = -2[lnL_R - L_U] \qquad (1\text{-}4)$$

Where L_R and L_U are the log-likelihood functions evaluated at the restricted and unrestricted models, respectively (GREENE, 2012: 744).

A traditional goodness-of-fit test used in logistic regressions for survey data is the Pearson's chi-squared test. It examines the sum of the squared differences between the observed and expected number of cases per covariate pattern divided by its standard error (ARCHER & LEMESHOW, 2006). The null hypothesis (H_0) for Pearson's Chi-square goodness-of-fit test is that sample data is consistent with a specified distribution. In order to reject the null hypothesis, i.e. to show that the model has an adequate fit, the chi-square statistic should not be significant (HOSMER, HOSMER, LE CESSIE, & LEMESHOW, 1997).

Another goodness-of-fit test is the Hosmer-Lemeshow test. It is similar to a Chi-square test, and indicates the extent to which the model provides better fit than a null model with no predictors, or, putting it differently, how well the model fits the data. It divides subjects into deciles based on predicted probabilities, and then computes a chi-square from observed and expected frequencies. If the test statistic is greater than .05 we fail to reject the null hypothesis that there is no difference between observed and model-predicted values, implying that the model's estimates fit the data at an acceptable level (HOSMER et al., 1997). A disadvantage of Chi-Square and Hosmer and Lemeshow goodness of fit measures is that it only tells us whether the model fits or not, and does not tell us anything about the extent of the fit. Similarly, like other significance tests, it is strongly influenced by the sample size since sample size and effect size both determine significance (HOSMER et al., 1997).

CHAPTER 5 – RESULTS

This chapter provides the results of the empirical work and discusses them against the theoretical background presented in Chapter 3 and in relation to the research questions set forth in Chapter 1. The chapter is therefore divided into three main parts:

1. Assess the impacts of frequent changes in the institutional and legislative framework on sustainable water governance.
2. Understand the incentives for collective action in the irrigation sector
3. Analyse the possibilities of a resilient system and the adaptation capacities of local communities exposed to climate change effects

The first part (Section 5.1) will provide an assessment of Albania's formal water governance and its de-facto implementation. The second part (Section 5.2) will present the results of the logistic regression models concerning the determinants that affect the financial and labour contributions for the maintenance of irrigation and drainage canals. And, the third part (Section 5.3) will present and discuss the results related to the adaptation of local communities to floods. Some critical reflections on the results and directions for future research are presented in Section 5.4.

5.1 INSTITUTIONAL ANALYSIS OF WATER GOVERNANCE

This section is devoted to the analysis of Albania's water governance. As discussed in Section 3.2, the governance system (GS) comprised one of the major components of the SES framework. The main subcomponents of the governance system identified as relevant for assessing the impact of frequent post-communist institutional changes on sustainable water governance comprised government organizations (GS1), non-governmental organizations (GS2), and the different sets of rules – "operational rules" (GS5), collective-choice rules' (GS6) and "constitutional rules" (GS7) – that regulate the functioning and operation of these actors in managing water resources in Albania.

The analysis will start by first identifying and explaining the factors that have brought about the frequent institutional changes in water governance, and afterwards, it proceeds with introducing the main actors that are involved in the water management at different levels of governance[23]. Their roles, responsibilities and functioning will also be described and analysed.

5.1.1 Institutional changes in Albania's water sector

In the theoretical chapter (Section 3.1), I presented the types of institutions as they are classified in the literature and discussed the views on how institutions change. Institutions were classified into *formal* which comprise the legal framework (laws, regulations) and *informal* consisting of social norms, customs, conventions and codes of conduct (NORTH, 1990). Here, the main focus will be put on formal institutions, i.e. the legal framework, related to water governance in general and irrigation and drainage in particular that has been enacted during the transition period in Albania. More specifically, I will show the evolution of water institutions and analyse the drivers that led to these institutional changes.

As noted earlier, institutions change via top-down, imposed enforcement and voluntary, bottom-up induced mechanisms. The imposed institutional change is generally enforced by governments through laws, orders or other legal instruments (LIN, 1989; NORTH, 1990; OSTROM, 2005). For natural resource management including management of irrigation and drainage systems, we mentioned decentralization and devolution policies as examples of imposed institutional change. In much of the literature, it is argued that these policies aim at achieving sustainable management of these resources by redistribution of decision-making and administrative power across administrative units or local communities (ANDERSSON & OSTROM, 2008). The instituting of these policies is not simply a result of a government's predisposition to give up power or reduce financial burdens on the state budget, though. It often comes from "recommendations" from international donors, whose funding policies strongly encourage institutional changes with decentralisation and devolution policies in focus (AGRAWAL & OSTROM, 2001).

Albania's first substantial institutional changes in the water sector with devolution focus were the Irrigation Code and Regulation for Water User Associations (WUAs) enacted in 1994 through Law No.7846, dated 21.7.1994 "On Construction, Administration, Maintenance and Operation of Irrigation and Drainage Systems" that set the legal basis for governing of irrigation and drainage systems and the formation of WUAs. Until 1991, the year when the land reform was implemented, irrigation and drainage networks were managed and operated in a quite centralized fashion. The main actors were the Water Enterprises (WEs) as the sole water authority at the district level and Agricultural Production Cooperatives (APCs) and State Farms (SFs) as beneficiaries. The Water Enterprises were responsible for the entire irrigation and drainage sector, including planning, construction,

[23] Note: The institutional analysis in this study does not focus on all aspects of water use. For instance, water supply for drinking purposes and waste water issues are not covered, although the respective governing authorities, as actors with a stake in water governance will be briefly mentioned.

management, operation and maintenance, while APCs and SFs as beneficiaries had to pay water fees (water fees were determined by the communist government) to WEs for the delivered irrigation water[24].

With the dismantling of APCs and SFs in 1991, WEs was the only responsible authority for water management at the district level. This, coupled with reduced investments in the overall irrigation and drainage infrastructure and budget cuts on WEs, led to the deterioration of these systems (KODDERITZSCH, 1999).

To remedy this situation, international donors (World Bank and EU) pledged financial support to initiate a project (The First Irrigation Rehabilitation Project) for the physical rehabilitation of the irrigation systems in 7 districts of the country, which would be associated with institutional changes in the governance of the irrigation sector. The physical rehabilitation consisted in the upgrading of the irrigation and drainage infrastructure and enforcement of dams. The area served by the rehabilitated irrigation and drainage infrastructure during the first phase of the project is about 98,000 ha with irrigation and 120,000 ha with drainage (WORLD BANK, 1999). Meanwhile, the institutional dimension focused on the introduction of Water User Associations (WUAs) that would be in charge of managing secondary irrigation canals and below, and where feasible, in the establishment of Federations of WUAs (FWUAs)[25] to be responsible for the management of the primary irrigation canals. It appeared though that the institutional reform was initiated without a detailed study of the local context. At the beginning of the institutional reform, WUAs were established based on village boundaries, disregarding an important fact; the hydrological characteristics of the irrigation systems (DEDE, 1997). Various problems started surfacing thereof. Conflicts over water allocation between the established associations sharing the same system became apparent. Tail-end associations faced water scarcities and could not mobilise enough labour force and revenues to cover maintenance works[26] (KODDERITZSCH, 1999; WORLD BANK, 1999).

In 1996, the Albanian Parliament made an amendment (Law No. 8111, dated 28.3.1996) to the previous law (Law 7846), determining that WUAs would no longer be based on administrative (village) boundaries but on single, integrated hydro-management units. The establishment of WUAs progressed rapidly. By

[24] The water charge had a uniform fee of 2.0 Lek/m^3. With the establishment of WUAs, it was provided by WE to WUAs in bulk with a fee of 0.5 Lek/m^3 (KODDERITZSCH, 1999).

[25] As explained earlier in previous chapters, Federations of Water User Associations (FWUA) are participatory entities comprising several WUAs, usually within one command area to take over responsibilities for the management of primary canals, reservoirs and headworks. During the first project, only 6 FWUAs have been established (WORLD BANK, 1999).

[26] According to a report from the WORLD BANK (1999), one of the main causes for system-scale water scarcities is however attributed to poor performance of Water Enterprises to deliver the required amount of water and to the deteriorated irrigation infrastructure especially after the civil unrests that occurred in Albania in 1997, triggered by the collapse of pyramid schemes that swiped off the savings of the majority of Albanians.

the end of the project in 1999, about 200 WUAs were formed operating in approximately 100,000 ha and involving about 50,000 family farms (WORLD BANK, 1999). After considering that the first project was deemed to have brought about positive impact on irrigation and drainage sector, international donors pledged financial support for a second project (Second Irrigation and Drainage Rehabilitation Project) that would expand also to other districts in the country. The objecttives of the second project were in line with the first one focusing again on physical rehabilitation of the irrigation and drainage systems and further institutional reforms in the irrigation and drainage sector (WORLD BANK, 1999). The second project would be implemented under a new and more reformist law (Law No. 8518 dated 30.7.1999 "On Irrigation and Drainage") that would serve as the base institutional framework upon which the management of irrigation and drainage systems will be based.

The law foresaw a deep restructuring of the governance of irrigation and drainage sectors at the district level. Key aspects of the law include provision of statutes for WUAs, direction for irrigation management transfer to them, and a framework for developing FWUAs. Another notable change consist in the dismantling of 36 Water Enterprises and establishment of 13 Drainage Boards (DB) to take over responsibilities for the management of the drainage infrastructure and operation and maintenance of major irrigation assets (primary canals, and reservoirs) until they have been transferred to FWUAs. The DBs are also government agencies financed by the state budget and will be under the responsibility of the Ministry of Agriculture, the main authority for irrigation, drainage and flood protecttion. In the frame of the second project, other 170 WUAs and 21 FWUAs were established, and additional 50,000 ha of land were to be served by rehabilitated irrigation infrastructure (WORLD BANK, 2005).

Although many WUAs and FWUAs were not performing as expected, strengthening of the role of WUAs and FWUAs on management of irrigation systems continued. The Government of Albania submitted another request to international donors to support a third project[27] that would again focus on rehabilitation of irrigation and drainage systems and flood protection infrastructure, as well as on expanding the institutional reform on the water sector. In terms of physical rehabilitation, it was reported that the project rehabilitated another 35,900 ha of irrigated land, 34,500 ha from improved drainage and flood control infrastructure, and 33 dams (WORLD BANK, 2010). The total area reported to have been rehabilitated in the three consecutive projects is summarised in Table 5-1.

[27] The third project, named "Water Resource Management Project", continued from 2004-2009, with a total cost of $33 million.

Table 5-1: Total improved irrigated and drainage area

Projects	Irrigated area (ha)	Drainage and flood protection (ha)
Project I	98,000	120,000
Project II	52,000	98,000
Project III	35,900	34,500
Total	185,900	252,500

Source: WORLD BANK, (1999, 2005, 2010).

Meanwhile, the institutional reform focused on strengthening the role of WUAs, FWUAs, DBs and other government agencies dealing irrigation, drainage and flood protection, as well as reviving the role of River Basin Authorities (RBA) (the establishment and the role of RBAs will be further explained in the subsequent parts of this section)[28].

The establishment of WUAs expanded rapidly across the country, although their performance was often below expectations. According to a World Bank report, 423 WUAs had been officially registered until the closure of the third project operating a total service area of 270,000 ha of irrigated land (WORLD BANK, 2010). Most of these governance structure remained however only on paper. SALLAKU et al. (2003) reports that by 2002, there were 404 registered WUAs, of which only 211 WUAs or 52 % were however functional. Similar cases of difficulties in establishing functional local water user groups are found also in other transition countries. THEESFELD (2008) while studying the impact of post-socialist reforms on the water sector found that the newly established WUAs resembled to what she called pseudo associations

Facing this situation, or putting it in WB words, "given the intrinsic weakness of WUAs, it was decided that small WUAs would be consolidated into bigger organisations that would serve larger areas, named Water User Organisations (WUOs)" (WORLD BANK, 2010: 11-12). For this purpose, Law No. 8518, dated 30.7.1999 was amended with the Law No.9860, dated 21.1.2008. That led to the establishment of three pilot WUOs serving an area of 12 000 hectares, two of which were part of this study, as shown in Table 4-3. The WUO has now been designed as a public, non-profit and self-financed entity that should serve their members' and public's interests (Article 12 of Law No. 9860).

As can be noted, the sustainability of these governance structures (WUAs and WUOs) in the management of irrigation and drainage systems remains highly questionable. This is reflected in the (non)-functioning of many of the rehabilitated irrigation systems (the total rehabilitated area is reflected in Table 5-1 above).

[28] The figures are taken from the official reports (authorized for public disclosure) produced by the World Bank and refer to the reported rehabilitated irrigation and drainage area.

Although, according to the World Bank US $ 240 million have been invested for the rehabilitation of irrigation and drainage infrastructure since 2000[29], through the three consecutive projects, "as of 2009, only 80,000 ha or 22 % of the equipped area was irrigated" (WORLD BANK, 2012: 1).

These outcomes tell us that even after decades of experience and knowledge generated from empirical studies carried out in many developing countries, lessons about irrigation management have not yet been learned.

One lesson is that government bureaucracies may fail to effectively manage irrigation systems when the focus is more on standard administrative procedures than on local management needs. Officials working in government agencies oriented towards construction have little motivation to improve operation and management performance in ways acceptable to users. And another important lesson is that the recurring costs for operation and management are more difficult to mobilise than for new construction. Thus, maintenance is often ignored, making new construction and rehabilitation needed more frequently than should be the case (VERMILLION, 1991).

However, in the Albanian case, some of the main causes for the non-functioning of many of the irrigation systems have been attributed to low performance of WUAs in terms of fee collection and maintenance of irrigation systems under their responsibilities; failure from government agencies at the district level – earlier WEs and later DBs – to deliver adequate amounts of water to WUAs and perform maintenance of primary irrigation and drainage canals; unclear responsibilities and frequent changes of personnel at the central level; and uncoordinated efforts between the different sectors that deal with water (WORLD BANK, 2012).

The low performance of WUAs has come mainly as a result of conflicts within and between WUAs related to water delivery to tail-end farmers and tail-end WUAs and high levels of free-riding among the farmers (SALLAKU et al., 2003). Whereas, the failure of government agencies to perform the required duties – deliver adequate irrigation water and maintenance of irrigation and drainage infrastructure – can be a consequence of shortage of personnel and budgets constrains. For instance, the government subsidies to WEs were cut from $US 1.6 million in 1994 to $US 500,000 in 1997. Also, from 1500 employers working for WEs in 1994 in the seven districts where the first project took place, by 1998 the number of WE staff went down to 588 employers (WORLD BANK, 1999). Currently, the countrywide DB staff is about 600 employers (WORLD BANK, 2012).

[29] The total costs of the three projects are: First Irrigation Rehabilitation Project US$ 44 million, Second Irrigation and Drainage Rehabilitation Project US$ 40.5 million and Water Resource Management Project US$ 40 million. According to WB report (WORLD BANK, 2012), since 2000, the aggregate public expenditures on irrigation and drainage sector amounts to more than US$ 240 million.

Another key challenge to the management of irrigation and drainage systems documented in several reports is related to an unclear institutional framework and incapacities of the responsible water authorities to fulfil their duties (MEFWA, 2009; SUTTON et al., 2013).

The institutional framework on the management of irrigation and drainage systems has evolved in parallel with other institutional changes in the water sector, yet with little convergence across sectors (WORLD BANK, 2012). It is characterised by a high level fragmentation. Also investment decisions related to water are often made on the basis of single sector considerations, leading at best to suboptimal investments and lost opportunities for capturing multi-purpose benefits considering Albania's climate change prospects (MEFWA, 2009; SUTTON et al., 2013).

Until 2012, the basic water law regulating the overall water sector in the country was Law No. 8093, dated 21.3.1996 "On Water Reserves". The law aimed at regulating the use, protection and development of water resources, as well as at drawing the national and river-basin-level institutional framework that would put into practice the national policies for administration of water resources. At the national level, a National Water Committee (NWC) was established to guide the water sector policy. The NWC was to be chaired by the Prime Minister and comprised ministers from key ministries that deal in some way with water resources, and a Technical Secretariat (TS) was established as an administrative agency. At the river basin level, six River Basin Authorities (RBAs) with regulatory and licensing powers were created in 2002. RBAs' establishment was to be based on participatory principles. Yet, its members were appointed by the government. As a result, the RBAs were unable to effectively perform their functions due to lack of financial resources and user representation (WORLD BANK, 2010).

A new donor-supported project has thus been commissioned for (i) establishing a strategic framework to manage water resources at the national level and in the Drin-Buna and Semani River basins. The new project[30] – the forth project on water resources – would contribute to (a) preparation of a national Integrated Water Resource Management (IWRM) strategy; (b) preparation of two agreed River Basin Management (RBM) plans for the Drin-Buna and Semani basins; and (c) establishment of a Water Resources Database; and, for (ii) improving in a sustainable manner the performance of irrigation systems: (a) percentage compliance with agreed seasonal water distribution schedules; and (b) increase in recovery of operation and maintenance costs as percentage of operation and maintenance charges invoiced (WORLD BANK, 2012: 5-6).

[30] The project called Water Resources and Irrigation Project is financed mainly by the World Bank (US$ 40 million) and it is expected to be implemented during 2013-2018.

The new project could not however be implemented on the existing institutional framework since it requires a more integrative approach. Hence, a new law (Law No. 111/2012, dated 15.12.2012 "On Integrated Water Resources Management)" has been passed by the Albanian Parliament to regulate the country's water resources. The objectives of the new law include (i) protection and improvement of the aquatic environment, internal surface waters, either temporary or permanent internal sea waters, territorial waters, exclusive economic zones, continental shelf, transboundary waters, groundwater, and their status; (ii) the security, protection, development and more rational use of water resources, the necessary for life and for social and economic development of the country; (iii) equitable distribution of water resources, as intended by the use and management of their effective management; (iv) protection of water resources from pollution, overuse and consumption on actual needs; (v) determination of the institutional framework, national and local level for the implementation of a national policy for the administration and management of water resources to the benefit of the community and the social and economic interests of the country.

One could argue that the changes in the water legislation are induced by inefficiencies resulting from previous institutional arrangements. That is partly true! It is partly because the institutional changes in Albania are conditioned also by political processes. As LIN (1989) argues, changes in other institutional arrangements are another source of institutional change.

Recently, Albania has been granted the EU candidate status by the European Commission and its working towards meeting the conditions for opening the negotiations for EU membership. This political process imposes conditions on Albania's government to align its institutional framework with the EU legislation in general and Water Framework Directive (WFD) in particular. As stated in Article 1 of WFD, the aim of the WFD is to establish a framework for the protection of inland surface waters in the country, transboundary waters, coastal and groundwater, in order to prevent further deterioration and protect aquatic and terrestrial systems; promote sustainable water use through long-term protection of water resources; improving the aquatic environment; reduction of pollution of groundwater and improving the quality of these waters; and mitigation of consequences and prevention of floods and drought.

The EU Water Framework Directive requires to the Member states to a) identify their water bodies, b) describe/characterize these water bodies, c) establish environmental objectives for these water bodies, d) define a number of basic and supplementary measures in accordance with the objectives set, e) monitor the environmental conditions of water bodies, f) manage water resources based on a river basin approach, g) develop river basin management plans (RBMPs),

h) involve all stakeholders in the development River Basin Management Plans (RBMPs), and i) cover costs for water services.

Many of the highlighted drawbacks in Albania's water governance reveal the outcomes of the enforced institutional changes via the implementation of the above mentioned projects. From these, one may conclude that the main water governance problems are mainly a consequence of poor performance from governance structures assigned by the continuously changing institutional framework to perform management responsibilities. This outlook can rightfully be used as an excuse to undertake continuous institutional changes in reforming the overall water governance setting.

However, what may be missing in this outlook is how the process of institutional formation was designed. To be more precise, it does not reveal the actors involved in the institutional formation process. In several expert interviews at the regional level and informal conversations with farmers, it was pointed out that the actors' participation was more a formality rather than a seriously intended open-for-ideas approach. Farmers and other local level actors were hardly involved in any of decision-making processes concerning the management of irrigation and drainage systems and flood protection. All they were aware of was, at best, that the irrigation and drainage systems are going to be rehabilitated by the World Bank.

In this way, the "institutional designers" have missed and failed to capitalise on local knowledge and experience, which, as theory suggest, are important ingredients for institutional design processes (OSTROM, 2005), and adaptive governance of water resources (PAHL-WOSTL, 2009).

The process of institutional design is one aspect of evaluating the outcomes of enforced institutional arrangements. The other important aspect is to understand the roles and responsibilities of the main governance structures involved in water management.

5.1.2 Main actors of Albania's water sector (GS)

As noted in above, the governance of water resources in Albania is rather complex and fragmented. It is characterised by the involvement of several actors at different governance levels. The main authorities at the national level are; a) National Water Council (NWC), b) Technical Secretariat of National Water Council (TSNWC) as the executive agency of the NWC, and c) relevant ministries that deal with water resources. The water authorities at the regional level include, a) River Basin Councils (RBC), b) River Basin Agencies (RBA), c) Drainage Boards (DB), whereas the governance structure dealing with water management at the local level include Water User Associations/Organisations (WUA/O). The NWC includes the Ministry of Agriculture, Rural Development and Water Administration (MARDWA), Ministry of Environment (MoE), Ministry of Energy and Industry (MEI), Ministry of Transports and Infrastructure, Ministry of Interior (MoI), Ministry of Health (MoH) and Ministry of Finance (MoF). These actors comprise the national level governance and are responsible for drawing and implementing the water policies and strategies country-wide.

Since the enforcement of the new law (Law 111/2012) on integrated water resource management and government changes after the general elections of 2013, the administration of water resources has moved from the Ministry of Environment (before 2013, it was called Ministry of Environment, Forests and Water Administration) to the current Ministry of Agriculture, Rural Development and Water Administration (MARDWA) (before 2013, it was called Ministry of Agriculture, Food and Consumer Protection).These institutional and political changes have transformed the MARDWA from an actor that was primarily responsible for irrigation, drainage and flood protection into the main actor that will follow the implementation of the WFD – approximated water legislation (Figure 5-1). Previously, the alignment of legislation with the EU-WFD and other water sector-related activities, such as implementation of water policies, monitoring of water quality, issuance of permits and authorisations[31] for water resource use, or supervision of RBAs' work was carried out by the Ministry of Environment. Currently, the main responsibility of the Ministry of Environment from the water sector point of view concerns the monitoring, controlling and determining of ecological and environmental qualities of country's water resources. Meanwhile, the Ministry of Energy and Industry is responsible for water used for energy production, whereas the Ministry of Transports and Infrastructure is mainly responsible for the construction of water supply and wastewater treatment infrastructure[32].

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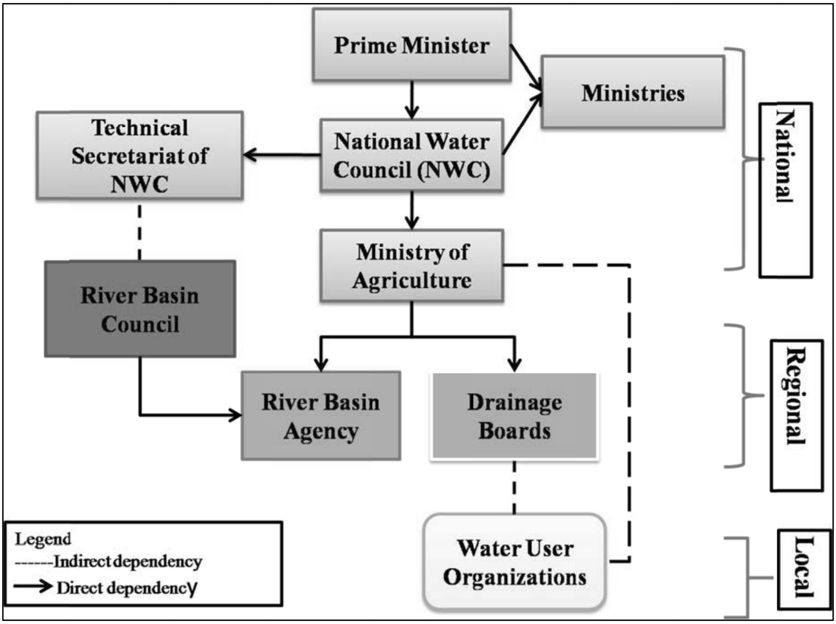
[31] With the new legislation, permits and authorisations for water-related activities will be issued mostly by the National Water Council, and only specific cases, will also be issued by River Basin Councils.

[32] Management (operation, maintenance, water charges etc) of water supply and sewage systems is the responsibility of local governments (municipalities).

Figure 5-1: Schematic representation of Albania's water governance



Source: Own design with inputs from TS experts.

For flooding emergencies, there is an emergency unit attached to the Ministry of Interior that is in charge for coordinating emergency activities and actors. The Ministry of Health and Ministry of Finance have a minor direct role, but not least important since both actors deal with health safety and financial aspects of water governance, respectively.

Although all these national-level actors are important for Albania's water sector in general, they will not be discussed in detail separately, given the focus of the work is primarily on the management and governance of irrigation and drainage systems and flood protection. For this purpose, the analysis and discussion will be concentrated on the Ministry of Agriculture, Rural Development and Water Administration since it is the responsible national actor for the irrigation and drainage sector and flood protection. Also, the lower level governance structures (RBAs, DBs and WUA/Os) are under the authority of MARDWA, as shown in Figure 5-1 above. The roles and responsibilities of the National Water Council and its Technical Secretariat as the highest water authority in the country will also be briefly highlighted.

5.1.2.1 Water management at national level

As just mentioned above, the National Water Council is the highest authority for water management in the country. Some of its key responsibilities deriving from the new institutional framework (Law 111/2012 and other by-laws) on water resources include the drawing regional and national strategies, policies, plans and projects on the agriculture sector, industrial and territorial development with focus on water protection and management. The new law designates the NWC as the government body in charge for the implementation of international agreements, conventions on water resources, in which Albania is a party. The NWC is currently responsible for issuing permits and authorisations for water use and discharges for activities that are carried out beyond the borders of a single river basin, as well as for approving requests for concessions on water resource.

Another responsibility of the NWC is the approval of the regulation of the Technical Secretariat, which, as noted above, is the executive and technical branch of the NWC.

5.1.2.1.1 Role and responsibilities of the technical secretariat of NWC

The Technical Secretariat of the National Water Council is the technical and executive body of the NWC. Its competences include; a) implement national water resources policy, approved by the National Water Council; b) implement the provisions of international agreements and conventions for transboundary water resources, part of which is the Republic of Albania; c) develop a national inventory of water resources both in terms of quantitative and qualitative, according to the rules set by National Water Council; d) propose to the National Water Council issuing of permits and authorizations for water use and discharges; e) requests and collects from state agencies and other public entities information, technical data, analysis and technical consultative support that serve the needs of the administration and management of water resources; f) prepares the meetings of the National Water Council; g) promote the participation of water users in the management and administration of water resources; h) promotes studies and research for the development of technical innovations associated with the use, disclosure, utilisation, storage, handling, protection, management and efficient use of water resources; i), outlines, in collaboration with research/scientific bodies, areas of research on water resources; j) coordinates and supervises the work of local actors involved on water resource management and follows the procedures for issuance and enforcement of permits and authorizations; and k) follows the implementation of river basin management plans (Law No. 111/2012, Article 11).

The Technical Secretariat is organised in three departments and has a total staff of 23 employees. The departments include 1) the Department of Excellence, which is responsible for building the integrated systems, 2) the Department of

Water Resources Management, which is responsible for the integrated management of water resources, and 3) the Department for Human Resources and Supporting Services, which is responsible for human resources and assets management (pers. comm. with a TS expert).

5.1.2.1.2. Ministry of Agriculture, Rural Development and Water Administration

Ministry of Agriculture, Rural Development and Water Administration has been the main authority for irrigation, drainage and flood protection activities. As one can expect, the ministry is involved in policy drawing, budgeting, coordination and supervision of all activities related to irrigation and drainage management as well as flood protection. It even monitors and controls the physical conditions of technical assets and equipments operated by Drainage Boards that enable functioning of pumping stations used for drainage and of the heavy machinery (excavators) used for the maintenance of the main drainage canals.

Since the realization of these duties is very much a function of financial resources, the ministry is highly involved in the process of assigning of duties, budget allocation and in the planning of works to be carried out by the Drainage Boards and other actors.

The involvement of the ministry in planning and assigning duties for DBs points to a highly centralised hierarchical setting and leaves little room for DBs to adapt to emerging and unexpected contextual realities. The centralised and imposed fashion of ministry's involvement in the irrigation and drainage management is reflected also in the institutional arrangements governing these resources. According to the amended Law of 2008 on irrigation and drainage, the ministry encourages and monitors the establishment and consolidation of Water User Organizations and Federations, as well as it overlooks their legal, technical and economic activities. The WUA/WUO statutes are also drafted by the ministry in a one-fit-all template. This imposed institutional framework disregards the varying local context of each community. Such an approach has been widely criticised for failing to account for differences in socio-cultural, economic and physical factors of local communities (OSTROM, 2007).

Currently, the authority and responsibilities of MARDWA in the water sector have expanded. It has become a key authority for the implementation of the integrated water resource management approach undertaken by the Albanian government. This has been associated with changes in staff and administrative structures[33]. Also the so far-obsolete River Basin Agencies would now have to report to MARDWA.

[33] Changes in staff and administrative restructuring are expected to continue also in the future. According to experts from the MARDWA, changes are expected also in the legislation related to irrigation and drainage. Therefore, there might be some inconsistencies in terms of naming of departments or directorates, or recent legal references which the author may have failed to reflect in this work.

5.1.2.2 Water management at regional level

At the regional level, the main actors involved in water governance and management are the River Basin Councils, River Basin Agencies and the Drainage Boards.

5.1.2.2.1 Role and responsibilities of River Basin Councils

With the new law, the water governance at the lower levels is carried out in a basin scale. Law 111/2012 defines the concept of the River Basins District as the area of land and sea, comprising one or more neighbouring river basins, together with their associated groundwater and coastal waters. This implies that two or more River Basins can be compiled together for more efficient management. The responsible body for integrated water resource management of a river basin at the local level is the River Basin Council (RBC), whose mission is to protect water resources from pollution, misuse and damages that affect waters' quality and quantity and to ensure an efficient management and fair allocation of water resources within the river basin. In terms of their legal status, RBCs are public entities and report to the Technical Secretariat of the NWC.

Currently, there are 6 water basins in the country, namely Drin-Buna River Basin, Mati River Basin, Erzen-Ishëm River Basin, Shkumbin River Basin, Seman River Basin and Vjosa River Basin. The case study areas (Shkodra and Lushnja) of the work at hand fall under Drin-Buna River Basin and Seman River Basin, respectively.

The RBCs are chaired by the Prefect of the district in the respective river basin and composed of representatives from the local level government, regional government agencies and one third of representatives come from the business community. Farmers are hardly involved in these supposedly collegial structures. Even where they are represented, mostly through WUOs, they have no saying in the decision-making process.

This institutional arrangement leaves farmers' interests, the least to say, unrepresented, with possible implications for the long term development of the agriculture sector.

According to a specialist from Lushnja DB, there have been cases where the interests of the business community have not only been given priority over the long-term viability of the agriculture sector, but have also prevailed over fundamental environmental considerations. In a concrete case, he explains, an energy development project drawn by private actors – to be implemented on Devoll River that feeds the Thana Reservoir – that could, the least, have drained Thana Reservoir was put forth for approval, but vetoed by the DB representatives for its negative environmental impact on the reservoir.

Currently, the situation of unrepresentation has extended also to other actors at the local level due to lack of meetings. For instance, the Drin-Buna RBC has met only once in two years (pers. comm. with a Shkodra RBA representative). As explained above, the main reason for calling RBC meetings were mostly related to issuance of water use authorisations (pers. comm. with DB expert). Since the issuance of authorisations and permits for water use and discharge is now mostly carried out by the NWC, the RBC's find "no good reasons" to call meetings (pers. comm. with Drin-Buna RBA expert). This is related to the other key duty of RBCs, i.e. approval of river basin management plans. At country-scale, only one river basin management plan has however been drafted so far, namely the Mat River Basin Management Plan, while the Drin-Buna River Basin management plan is in the drafting process. Both management plans have been financed and technically supported by international donors, mainly the World Bank, with direct involvement of MARDWA and close supervision and coordination from the TSNWC.

Thus, the functioning of RBCs depends on the decision – making "freedom" assigned by central water authorities, namely the TSNWC and technical inputs provided by the River Basin Agency under its authority. The imposed changes in institutional arrangements for RBC functioning risk transforming them in a merely redundant governance structure in Albania's water governance constellation.

5.1.2.2.2 Role and responsibilities of River Basin Agencies

Another governance structure that operates at the river basin level is the River Basin Agency (RBAs). The RBAs are the executive and technical agencies whose key responsibilities of RBAs include; a) preparation of draft – plans for the management of water resources in the respective river basin and their submission to the respective RBC for approval; b) inventorying and periodic updating of the quality and quantity of water resources; c) encouraging the participation of water users in the management of water resources; d) preparation of reports and recommendations on water resources which are then proposed to the respective RBC for follow-up; e) preparation of materials for RBC meetings; f) and following the implementation and enforcement of the NWC and RBC decisions.

According to a representative from Drin-Buna RBA almost none of these responsibilities are properly performed due to lack of financial resources and adequate staff. The Drin-Buna RBA has for instance seven employees in total, three of which perform administrative duties and the remaining four are hired for their political contributions, with no corresponding technical expertise (pers. comm. with a RBA representative).

Furthermore, another key responsibility of RBAs is the preparation of river basin management plans and inventorying of the quality and quantity of water resources in the respective river basin; tasks which are de facto performed by central water authorities (TSNWC and MARDWA) under the auspices of the recent World Bank-financed project "Water Resources and Irrigation Project", with limited input at the local level.

This passive role of RBA, which appears to be imposed by the governments' tendency to centralise many water governance functions will very likely have a negative impact on the RBAs' future performance in the implementation of the EU's WFD requirements for water management.

5.1.2.2.3 Role and responsibilities of Drainage Boards

Drainage Boards are a key regional administrative bodies involved in the management of water resources. They are state-financed agencies[34], primarily responsible for drainage and flood protection (Law 8518, amended with Law 9860). Currently, there are 13 DBs operating in the country. The basic responsibilities and functions performed by DBs include cleaning and maintaining drainage canals, collector drains and drainage pipelines; operating and maintaining drainage pumping stations; inspecting, supervising and regulating drainage systems and structures for protection against flooding; preparing rapid response plans to threats of flooding; maintaining protective structures against flooding of river and sea; and managing rivers and streams, where necessary, to prevent excessive soil erosion (Law 8518, Article 39).

Performance of these basic functions requires considerable financial resources and adequate staffing. The required annual maintenance expenditures for drainage and flood protection amount to about US$ 16 million (WORLD BANK, 2010). Currently, the government of Albania spends about US$ 5-6 million on these activities (ibid). Meanwhile, according to a specialist from the TS of NWC, the costs to fully rehabilitate and bring the entire drainage and flood protection infrastructure (canal desiliting, repair of pumping stations, enforcements of river embankments, purchase of new excavators and other technical equipment) to full functionality are estimated to reach over US$ 200 million.

These are prohibitively high costs for the budget of a poor country like Albania. Moreover, carrying out of these activities requires that DBs are adequately staffed and equipped with the necessary technical infrastructure. Currently, the DBs' staff across the country is about 600 employees.

Shkodra Drainage Board alone, for instance, has a staff of about 50 employees. The major part of the staff is nevertheless involved in administrative matters and in looking after the pumping stations. The staff involved in field activities consists of 3 excavator drivers and 1 guard for the embankments. According to an expert

[34] Law 8518 specified three types of Drainage Boards: Drainage Boards financed by the state budget, Drainage Boards with self-financing, and Advisory Drainage Boards. With new amendments (Law 9860), DBs with self-financing and Advisory DBs have been dismantled.

from Shkodra DB, the staff involved in the field is insufficient considering the vast surface and many kilometre long embankments for flood protection.

Apart from the day-to-day operational constraints, the work of DBs is further complicated by the unclear and overlapping institutional arrangements related to responsibilities over parts of irrigation systems. For several years, there has been a growing institutional gap over which organization is responsible for the management of the intake and primary irrigation canals. As noted earlier, Law no. 9860 (Article 17) has vested Drainage Boards with the right to undertake in special cases the exploitation and maintenance of a dam or irrigation primary canal for a specified period of time (no longer than 5 years) when it is not privatised or transferred to a WUO and FWUO.

In reality, the irrigation infrastructure has so far been transferred only in-use, and that, only for secondary level canals and below. Based on secondary data and expert interviews, no functional primary irrigation canals have yet been transferred to these local level organisations and are still under the responsibility of DBs. So far, only some non-functional reservoirs with the corresponding non-functional irrigation system have been transferred to local level governments (*Komuna*) (pers. comm. with MARDWA specialists).

This points again to the key sub-component of the SES framework, the property rights (GS4). In the theory chapter, it was discussed that the sustainable management of CPRs depends also on how well the property rights regimes – be it state, private, common property, or open access – cope with the problems of allocating the costs and benefits of managing a particular resource, and moreover, on how clearly the property rights are defined (SCHLAGER & OSTROM, 1992). Without clear property rights – regardless of the property rights regime – the prospects of a long-term CPR management are diminished due to uncertainties over future benefit streams (BROMLEY, 1992).

In irrigation systems, the problem of defining clear property rights is more pronounced due to involvement of multiple actors (BROMLEY, 1992). In these cases, the incentives of the involved actors are difficult to converge. As noted earlier, government agencies tend to focus more on new constructions or rehabilitation works rather than maintenance activities due to difficulties in mobilising recurrent costs (VERMILLION, 1991).

The issue of property rights over irrigation systems is only one aspect that determines management incentives from both government agencies and communities. So far, I have discussed only the role and responsibilities of main national and regional level government agencies involved in water management. Since, the Albanian legislation has assigned formal roles and responsibilities also to local communities, through WUA/Os, for the management of water resources, it is necessary to explore how these local level governance structures function in practice.

5.1.2.3 Local level water management

The devolution policy initiated by the Albanian government for irrigation management follows the international trend on natural resource management found in many transition and developing countries (AGRAWAL, 2001b). As explained in the theory chapter (Section 3.1.5), transfer of natural resource management to local communities is driven by the theoretical assumption that devolution leads to the equitable and efficient management of natural resources, because people are more likely to respect and follow rules when they have been involved in designing them (LARSON & RIBOT, 2004). Rules suggested for analysing self-governed common resources included boundary, scope, position, aggregation, authority, information, and pay-off rules, which could be considered as fundaments for designing basic principles for long-lasting and sustainable CPR management, including irrigation systems (OSTROM, 1986, 1990). These design principles consisted of 1) clearly defined boundaries, 2) congruence between appropriation and provision rules and local conditions, 3) collective choice agreements, 4) monitoring, 5) graduated sanctions, 6) conflict resolution mechanisms, 7) minimal recognition of rights to organise, and 8) nested enterprises (OSTROM, 1990). Their success though depends on how many of these design principles are in place and enforced by actors. OSTROM (1990) shows that when there are adopted only some of the principles, the institutional setting will be fragile and may not resist over long periods of time.

The next step in the analysis is thus to analyse the above principles in our study areas, with the aim to investigate whether and how much space is given to the formalised water user groups (i.e. WUO) to self-organise and design their own rules for managing their irrigation systems. That allows us to understand also the way rules have been implemented and changed over time.

It was already mentioned throughout the text that water management at the local level in Albania is formally performed either by local water user groups (WUO), where they function, or DBs in cases when the irrigation management has not been transferred to local communities. Water user groups were initially established as Water User Associations (WUA), but later transformed into Water User Organisations (WUO) (Law 9860, Art. 13). Water User Associations were entrusted to manage irrigation systems at the secondary level and below. The formation of WUAs was based on voluntary membership by farmers using land within the service area. Farmers who do not join the association could still receive irrigation water from WUA, but would have to pay more than members (up to double the amount) (Law 8518, Art.11/2)[35]. With the transformation of WUAs into WUOs, the membership was no longer based on voluntarism, but all farmers using land in the service area were by law considered to be WUO members, who were all entitled to equally benefit from WUO services. WUOs would serve larger areas and would be responsible for the whole irrigation system, including headworks and primary canals.

The infrastructure would be transferred to WUOs in-use for a period no less than 10 years. Ownership and concession options are also recognised by law. Also their legal status changes into a public entity (Design Principle 8), i.e. their performance is not only an issue for their members but concerns the general public interest.

The changes in membership and service area reflect changes in boundary rules. Boundary rules – as explained in Box 1 in the theory chapter (Section 3.1.3) – define who is in or out of a given situation, in the sense of who is served by the system, how the membership is defined, is the system part of a larger irrigation system, and are outside people involved in the system (OSTROM, 1986).

The membership in the case study areas is based on land ownership or use, whereas the system managed by the WUO is part of a larger irrigation system since primary canals and headworks have not yet been transferred to them and are currently operated by DBs. There are two issues worth highlighting here. The first issue is that although the boundaries of the group and of the resource may be recognisable in terms of who is in the user group, or in terms of irrigation system's extension, it is not clear though what happens if one wants to be left out of the user group. This points to the second issue, delineation of group boundaries. The delineation of group boundaries with the new law is not performed by farmers themselves. Instead, it was designed and imposed by external authorities via a process in which farmers have hardly participated.

One implication from this is that the compulsory membership in WUO may have an impact on voluntary engagement of farmers in collective action for maintenance of irrigation and drainage canals, in terms of different forms of contributions – either financially, labour or other forms (for example, in kind).

With the new law (Law 9860/2008) and WUO statute, members would no longer have to pay membership quotas, but only for the services – maintenance fee and irrigation water fee – offered by the WUO[36].

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35 Article 12, paragraph 1 of the Law 8518 stipulates that every person, juridical or natural, that has land in ownership or in-use within the service area enjoys the right to become member of a WUA. Once becoming a member, the farmer would have to pay an annual membership quota to the WUA. Apart from membership contributions, members would pay also fees for irrigation water, canal maintenance and any other fee set by the WUA (Law 8518, Art.19).

36 According to one of the WUO representatives, most of WUO's maintenance works are generally to be performed at the secondary irrigation canal and lower level drainage canals.

The statute of WUOs operating in our study areas stipulate that the maintenance fee is calculated for each surface of land within the service area regardless of the fact whether the land is actually used or not. The calculation method for each farmer is based on the size of land owned by each farmer over the total surface of the service area, while the fee is to be collected by WUO every beginning of the year, until January 31, so that it prepares the canals for the coming irrigation season. By including in the calculation the entire surface each farmer owns, farmers would be unfairly charged for surfaces of their land that is not actually irrigated. We know from Albania's land reform egalitarian principle that each farmer was entitled to equally receive land from the different land categories available for distribution (for example, irrigated, non-irrigated and grassland land). From our data, the share of land that is not normally irrigated (fallow land and grassland) amounts to about 13 % of the total surface.

The incentives of farmers to contribute for maintenance may be therefore diminished since they know they will not be served with irrigation for these plots of non-irrigated agricultural land.

However, although the contributions to maintenance of irrigation and drainage canals appear to be compulsorily determined and the works are to be performed by WUO, farmers – as it will be discussed in the subsequent section – do often voluntarily and privately contribute financially and with labour for maintenance of different canals.

The irrigation water fee is, on the other hand, calculated based on the irrigated surface and number of irrigation times[37]. This calculation method is uniform across the country including our study areas served officially by WUOs. Meanwhile, the operational rules (water allocation, fee collection, monitoring and sanctioning) and the authority responsible for implementing and overseeing operational rules appear to be different in the two study areas.

In Lushnja, since the infrastructure above secondary irrigation canals is managed by Drainage Boards, they are, as a result, also responsible for delivering water to WUOs. The WUO would in turn have to deliver it to individual farmers based on their water demands. For this purpose, a water allocation plan is prepared in weekly basis. The WUO collects, during the week, the requests from farmers and then it should every Friday submit to DB the amount of water for irrigation that farmers have demanded. Based on these demands the DB delivers to WUO the requested amount, which is then distributed to individual farmers. While WUOs receive the water free of charge, the farmers pay based on the surface of land irrigated. The water fee is 3000 Lek (about 23 Euros) per hectare. The collection

[37] The WUO statute and Law 9860 foresee three calculation methods for water fees; 1) the irrigated surface and number of irrigation times, 2) volume of water used, or 3) duration of irrigation measured by time units. In our study areas, it is used the first method, i.e. the irrigated surface and number of irrigation times.

of water fees, water delivery to individual farmers and monitoring that no illegal infringement is done to the irrigation system such as breaking canal structures, or illegally opening water gates are performed by WUO's water masters (*mjeshtrat*). In Lushnja region, there are three water masters hired by WUO who come from the communities in the service area. To be able to monitor their service area, water masters have been equipped with motorbikes that were provided within the frame of WB-supported projects.

In Shkodra region, the operational activities are performed differently. Farmers reported an increased involvement of the local government (Komuna) in the functioning of WUO. For instance, the payment of fees for maintenance and irrigation has been conditioned with issuance of official documents from the local government. If a farmer would need to retrieve from the local government any official document (birth certificate, or ownership certificate and so on), the local government would not issue it unless the farmer pays the annual maintenance fee or withstanding irrigation fees. The local government's involvement extended to other issues interfering with WUO's functions in terms of organisational matters and field works. The WUO has basically been transformed into a branch of the local government, with no de-facto independence. Farmers' perception over which governance structure is responsible for fee collection reveal that out of 38 respondents in the villages that are officially served by WUO, 58 % or 22 respondents state that irrigation and maintenance fees are actually paid to the local government, 5 % or 2 respondents state WUO, 26 % or 10 respondents do not pay fees, and the remaining 10 % or 4 respondents answered "I don't know" (see Table 5-2).

Table 5-2: Authority for fee collection

Authority for collecting water fees	Shkodra	Lushnja
No fee payment	26.32	21.05
WUO	5.26	78.95
Local Government	57.89	0
I don't know	10.53	0
Total	100	100

Source: Own data; N=38 for each region.

Note: Values are in percentage.

The takeover of WUO's responsibilities, or in more neutral words, the WUO's invisible role in irrigation management in the study area is reflected in farmers' responses regarding the existence of any association in their community (see Table 5-3). And, out of the three affirmative responses, two farmers pointed to the existence of the WUO and one referred to a Farmer Association.

Table 5-3: Existence of any type of association in the community

Existence of any association	Shkodra	Lushnja
No	89.47	0.00
Yes	7.89	100.00
I Don't Know	2.63	0.00
Total	100.00	100.00

Source: Own data; N=38 for each region.

Note: Values are in percentage.

Contrary to Shkodra region, in Lushnja region, all interviewed farmers point to the existence of the WUO and view it as the responsible authority for fee collection and operation of the irrigation system. About 80 % of the respondents refer to WUO as the authority in charge for fee collection, whereas the remaining 20 % respond that they do not pay fees.

Monitoring is another important operational activity needed to sustain CPR institutions. The point is who performs these activities in self-organised groups, i.e. are there group members themselves involved in monitoring and designing sanctioning procedures, or are these activities performed by external authorities. According to Design Principle 4, community members in self-governed settings would create a better knowledge of each other and a history of past commitment to communal rules, if the community members conduct the monitoring (OSTROM, 1990).

In our study areas, farmers' responses about who monitors the water delivery to individual farmers point to almost the same authority responsible for water fee collection. As shown in Table 5-4, the majority of respondents in Shkodra (about 60 %) state that monitoring of water delivery to farmers is performed by local government, whereas about 80 % of respondents in Lushnja report that monitoring is performed by WUO (through the water masters).

Table 5-4: Authority for monitoring of water delivery

Authority for water monitoring	Shkodra	Lushnja
No monitoring	21.05	21.05
WUO	7.89	78.95
Local government	57.89	0.00
Government	2.63	0.00
I don't know	10.53	0.00
Total	100.00	100.00

Source: Own data; N=38 for each region.

Note: Values are in percentage.

However, although farmers in Lushnja state that there is no involvement from external authorities in monitoring of water delivery, in practice, Lushnja DBs undertakes some monitoring activities. According to an expert from Lushnja DB, the DB has the right to control the irrigated surface to make sure the farmers have received the requested amount of water, the collection of water fees for the irrigated surface, as well as maintenance activities pertaining to secondary irrigation canals.

In cases it finds that these activities have not been properly performed, the DB should report to the Ministry of Agriculture, Rural Development and Water Administration (MARDWA). By law, MARDWA has the right to oversee all WUOs legal and financial activities and implement sanctions which range from administrative punishments such as fines to dismissal of the Administrative Council (Law 9860, Article. 56). The Administrative Council is a body of WUO, responsible for the overall administration and functioning of WUO. The organisational structure of WUOs as specified in their statute is shown in Box 2.

Box 2: Statutory organisational structure of Water User Organisations[38]

The Administrative Council is one of the main structures of in WUO's organisational chart. By law and WUO's statute, the WUO's organisational structure consists of; a) General Assembly, b) Administrative Council, c) Chairman and Deputy Chairman, d) Audit Commission, and e) Executive Staff.

The General Assembly is the highest decision making body of WUO and shall assemble once (or twice) a year. The main issues to be approved by the General Assembly include the election of the Administrative Council and Audit Commission; approval of the annual balance-sheet, annual reports and proposed annual budget (it shall make sure that at least 35 % of the revenues from maintenance fees and water fees is allocated to pay the executive staff and 10 % would go to the reserve fund). The Assembly shall also approve operation and maintenance plans of the irrigation system, water distribution plan, the level of fees and tariffs to be collected by the WUO, changes in the statute, internal regulations, as well as sanctions to be applied in cases of rule infringements.

The Administrative Council is responsible for the administration and functionning of WUO, and is accountable to the General Assembly. It consists of 3-11 members who are elected by the General Assembly and serve a four-year term, with the option to be re-elected.

The main tasks of the Administrative Council include calling on of Assembly's sessions, drafting of budget plan, work-plans, operations and maintenance

[38] As explained before, WUO statutes have been drafted in a one-fits-all template.

plans, as well as proposing the issues to be approved by the General Assembly and overseeing of financial procedures carried out by the WUO.

The Chairman and Deputy Chairman are elected by the Administrative Council and hold automatically the position of Chairman and Deputy Chairman of the Administrative Council, respectively. The Chairman is responsible for calling on the meetings of Administrative Council and General Assembly, representing the WUO in relation to third parties, and for signing contracts and other legal documents.

The Audit Commission consists of three members – a chairman and two members – who serve for a four-year term with one re-election right. The Audit Commission is responsible for auditing the economic-financial activities of WUO, results of which shall be reported to the annual meeting of General Assembly, and to the Ministry of Agriculture, Rural Development and Water Administration upon approval by the Assembly.

The Executive Staff consists of hired employees, namely General Manager (called also Executive Director), Water Masters and other staff depending on the circumstances. The General Manager is hired by the Administrative Council via an open competition process and shall have experience and qualification in irrigation management. S/he shall report to the Administrative Council and participate in its meetings, but has no voting rights. Other employees are selected by the General Manager also via an open competition process, in accordance with the approved WUO budget.

Source: ÇUKAS WUO STATUTE[39].

Meeting the legal and financial requirements provides enough incentives for WUOs to avoid sanctions from government authorities. Yet, this is little when compared to the efforts required to make group members follow the common interest.

As OLSON (1965) argues, rational self-interested individuals will not act in group's interest unless some form of coercion is exercised on them. Sanctions are considered one of such instruments that induce rule compliance and deter group members from violations of community rules (OSTROM, 1990). Ostrom suggests in Design Principle 5 that in order to maintain community cohesion sanctioning should be increased gradually based on the severity and repetition of violations.

Apart from legal requirements enforced by MARDWA, the WUO has its own sanctioning mechanisms stipulated in its statute, targeted to violations conducted by WUO members. Some of the common violations have to do with payment of

[39] All WUO statutes stipulate the same institutional prescriptions. The only difference between statutes involves the "WUO generalities", i.e. name, location and extent of service area, and address of the respective WUO.

irrigation and maintenance fees, blocking water delivery and breaking of canal structures (WORLD BANK, 2010; 2012). Depending on the nature and frequency of violations, sanctions foresee fines, suspension and expelling from WUO.

Empirical material has shown that, although – according to WUO representatives – violations occur, especially related to non-payment of fees, farmers as well as WUO representatives admit that sanctioning is seldom applied and in most of the cases nothing happens. Rarely, WUO representatives punish violators by not delivering water to them until they pay the outstanding fees. In Shkodra, as explained above, the only sanctioning instrument enforced (by the local government) on violators is the conditioning with issuance of official documents. Suspension and expelling have never occurred. These two sanctioning mechanism appear to contradict WUO's legal status as public entity and its membership principles which are not based on individuals' decision to join the organisation but automatically consider a member everyone who owns and/or uses agricultural land within the service area. Therefore, the question is what role do members actually play within the organisation? Do they participate in decision-making processes (collective-choice arrangements) that affect the existing operational rules when these rules deliver suboptimal outcomes?

As summarised in Box 2, the General Assembly is the collective choice arena in which operational rules and positions of actors within the organisation are approved and where rules can be changed through collective-choice arrangements. Collective choice arrangements are second-order institutional arrangements that enable resource users to participate in changing and modifying, with the lowest costs possible, their operational-level rules when they are affected by them (OSTROM, 1990, 2005).

In our case, farmers' participation in meetings of the General Assembly is sanctioned in the WUO's statute. The statute foresees that the General Assembly shall be assembled once or twice per year (Article 11/1). However, in practice, the attendance in meetings is rather low and varies with regions (see Table 5-5). In Shkodra, only 1 out of 38 respondents admitted to have participated in the meetings. In Lushnja, the participation rate is much higher, with 55 % (21 out of 38 respondents) of farmers responding positively, i.e. they have participated in meetings of the General Assembly. Participation is a key aspect in collective-choice arrangements because the attendance level determines the ability of the collective forum to make decisions (AGRAWAL & OSTROM, 2001).

Table 5-5: Participation in meetings of WUOs

Participation in meetings	Shkodra	Lushnja
No	97.37	44.74
Yes	2.63	55.26
Total	100.00	100.00

Source: Own data; N=38 for each region.

Note: Values are in percentage.

The decision-making process depends on the voting mechanisms applied by the community to approve and/or change their community rules (OSTROM, 1990). In the case at hand, the WUO statute stipulates two voting rules for approving Assembly's decisions; a simple majority rule and a qualified majority rule. The simple majority rule pertain mostly to operational-level rules (water use and maintenance plans; irrigation and maintenance fees; monitoring and sanctioning mechanisms), authority and position rules such as election of Administrative Council and Audit Commission, with the condition that at least 50 % of the members are present in the meeting (Article 11/3). The qualified majority rule, on the other hand, can be applied only for collective-choice rules, like amending the WUO's statute. Article 21 states "[the] organisation decides to amend its statute with 2/3 of General Assembly's votes".

Although, in reality, most of the operational rules have often underperformed, application of collection-choice rules by the community themselves, i.e. amending the statute to correct the inefficiencies of operational rules (lack of fee payments, sanctioning and effective group monitoring, for instance) has hardly occurred. The only time the statute underwent amendments was when WUAs were transformed into WUOs. And this change did not come about from collective-choice arrangements within the water user groups, but as a result of changes in constitutional rules; that is, changes in the national legislation concerning management of irrigation and drainage systems enforced by external authorities. Moreover, the changes were not targeted to address inefficiencies in operational-level rules and to support collective-choice processes. Instead, as explained above, they affected the boundary rules and the authority rules, leading to a higher involvement of government agencies (DBs and the MARDWA) in WUO's practices. The presence and the degree of implementation of the design principles in WUOs in both study areas is summarised in Table 5-6. In theory, external authorities need to recognise and support the efforts of local actors to organise and devise the system of rules that serves best their interests and which go in line with concepts of sustainable management of natural resources (Principle 7) (OSTROM, 1990). As OSTROM (2000) argues, locally devised system of rules, norms and property rights that are not recognised by external authorities may collapse if their legitimacy is challenged.

Table 5-6: Presence of design principles in WUOs in study areas

Design Principles	**WUO Shkodra**	**WUO Lushnja**
Principle 1 – *Clearly defined boundaries*	Weak	Weak
Principle 2 – *Congruence between appropriation and provision rules and local conditions*	Not present	Weak
Principle 3 – *Collective-choice arrangements*	Not present	Weak
Principle 4 – *Monitoring*	Not present	Weak
Principle 5 – *Graduated sanctions*	Weak[40]	Weak
Principle 6 – *Conflict resolution mechanisms*	Not present	Weak
Principle 7 – *Minimal recognition of rights to organize*	Not present	Weak
Principle 8 – *Nested enterprises*	Not present	Weak
Quality of institutions	**Failed**	**Fragile**

Source: Adapted from OSTROM (1990).

As summarised in Table 5-6, the presence of design principles in WUOs in the study areas is in large part weak and inexistent. That means that both WUOs exist mostly on paper and their role in water management is rather limited.

As the broad picture on roles and responsibilities of the various actors reveals, the water governance is carried out generally in a centralised fashion, with very limited involvement of local actors. Also, the institutional changes that have been enforced during the transition period have not reflected the characteristics of the local social and natural context. This may have an impact on the motivation of farmers to engage in collective action for maintaining irrigation and drainage canals, as well as may add further constrains for adaptation to likely climate impacts and opportunities may not be exploited given that institutional interaction across organizational levels can increase the diversity of response options and can deal more appropriately with uncertainty and change (OSTROM, 2005). Furthermore, considering Albania's integration process into the European Union, the implementation, in practice, of institutional requirements related to EU's WFD will be challenging. Although most of the legislation on water resources has currently been aligned to the WFD, key principles of WFD, for example coordination (Article 3) and public information and consultation (Article 14) appear to have already been neglected.

[40] The sanctions imposed on Shkodra WUO are not graduated, but rather arbitrary.

5.2. Determinants for maintenance of irrigation and drainage canals

This section will present the results of the study related to farmers' involvement in the maintenance of irrigation and drainage canals. At the beginning, I will focus on their perception over the responsibilities of each actor involved in the management of irrigation systems at the canal level. This will inform us whether actors share the same understanding over who is supposed to maintain what canal level. Afterwards, I will present farmers' perception over the condition of the irrigation system infrastructure. As it is argued in the theoretical part, farmers need to see feasible improvement in resource conditions in order to act collectively and self-organise, as well as have authority over the management of the systems. As explained in methodological chapter (Section 4.5.2), in order to test the statistical differences in frequencies of responses between regions and governance forms (with WUO or without WUO), the Kruskal-Wallis H-Test has been conducted.

In the last part of the section, I will present and discuss the results of the econometric analysis of the determinants of collective action to contributing financial and/or labour resources in canal maintenance and cleaning. The econometric method used is a logistic regression given that the dependent variable is of a binary form. The tests statistics for goodness-of-fit will be presented in Annex I.

5.2.1 Farmers' perception on responsibilities over canal maintenance

As already discussed in the previous section, the irrigation and drainage systems in Albania are managed by different actors at different levels of the canal system. The main actors are Farmers, Water User Organization, Drainage Board, Local Government (Commune) and the central Government (Ministry of Agriculture, Rural Development and Water Administration). To understand whether all involved actors share the same knowledge over who is supposed to maintain what canal, I make use of data triangulation by comparing expert information and secondary data on the responsibilities at canal-level with answers from farmers.

This is important for any investment and maintenance effort to take place. Meinzen-Dick (2014) argues that actors involved in management of irrigation and drainage systems need to have defined property rights and authority over the system in order to invest resources. Results show that farmers do not have clear knowledge over the exact actor who is in charge especially of the primary and secondary canals. As can be seen from Table 5-7, about 50 % of farmers perceive that primary canals are to be managed by Drainage Boards. About 10 % of respondents perceive WUO as responsible for maintenance of primary canals, whereas about 22 % and 14 % perceive the local government (Commune) and central government as the responsible authority for performing maintenance works, respectively.

Concerning maintenance of secondary irrigation canals, WUOs and Drainage Boards are perceived as the responsible authority by about 22 % of farmers, respectively. Meanwhile, the local government (Commune) and central government are perceived as the responsible authority by about 45 % and 8 %, respectively. With respect to tertiary irrigation canals, farmers widely view themselves as responsible for carrying out the maintenance works. More than 75 % of farmers responded that they are responsible for maintenance of tertiary irrigation canals. This is not surprising since tertiary irrigation canals are located at farmers' plots. But what still appears interesting is the perception that local government and other actors are viewed as responsible for maintaining the irrigation canals at the farm level. About 12 % of farmers perceive the commune as the responsible authority, whereas about 4 % perceive WUO and Drainage Board, respectively. In terms of secondary drainage canals, farmers perceive government authorities as the responsible actors for maintenance of these canals. About 55 % of farmers view the Drainage Boards as the main responsible actor for the maintenance works, whereas the commune and central government is perceived by about 30 % and 10 % of respondents, respectively.

Table 5-7: Perception on responsibilities over maintenance of different canals

	Farmers	WUO	DB	Commune	Govt.	P >| Z| (WUO)	P >| Z| (Region)
Primary irrigation canal	1.44	10.07	51.80	22.30	13.67	0.3276	0.7224
Secondary irrigation canal	2.11	21.83	22.54	45.07	7.75	0.0403	0.0037
Tertiary irrigation canal	76.55	4.14	4.14	12.41	2.76	0.0266	0.0011
Secondary drainage canal	2.05	3.42	55.48	29.45	9.59	0.5242	0.0015
Tertiary drainage canal	55.48	1.37	13.01	23.97	6.16	0.2372	0.0001

Source: Own calculation; N=152[41]; Values are in percentage; Reported P-values are corrected for tied ranks.

Note: Kruskal-Wallis H-Test for governance differences in perception over irrigation system and canal conditions with 1 degree of freedom at 10 %significance level; N =76 for WUO=1: N= 76 for WUO=0.
Kruskal-Wallis H-Test for regional differences in perception over irrigation system and canal conditions with 1 degree of freedom at 10 %significance level; N =74 for Shkodra: N= 78 for Lushnja.

41 "I don't know" was answered by 13 respondents for primary irrigation canals; 10 respondents for secondary irrigation canals; 7 for tertiary irrigation canals; 6 for secondary drainage canals; and 6 for tertiary drainage canals.

Regarding tertiary drainage canals, about 55 % of the interviewed farmers view themselves as responsible for the maintenance of these canals and the other share of responses go to Drainage Boards and commune, 13 % and 24 % respecttively.

In order to account for any differences in perception between villages where the irrigation system is managed by WUO and villages where there is no WUO, I conducted the Kruskal-Wallis H-Test. the only differences appear to be in perceptions over responsibilities for maintenance of secondary irrigation and tertiary irrigation canals. These differences are indicated by the significant P-values shown in Table 5-7. The null hypothesis of Kruskal-Wallis test is that the mean ranks of samples from the populations are expected to be the same. If the P-value returns signifycant, then we can reject the null hypothesis and conclude that the two groups are significantly different from each other.

The differences in perceptions when accounting for the form of governance can be explained with the fact that farmers, although not highly involved in WUO, know at least about their key responsibilities.

The Kruskal-Wallis test was conducted also to account for differences in perceptions between the regions. Apart from primary irrigation canals which showed no significant P-value, results indicated that there are significant regional differences in perceptions over responsibilities for maintenance of all other lower-level canals.

These regional differences can be particularly explained by the takeover of WUO in Shkodra by the local commune. During interviews many farmers expressed their confusion about the current and future involvement of the WUO in irrigation management since several tasks, especially fee collection was performed by the commune.

However, in general, the overall differences in perception about which authority is responsible for which canal level can be considered a reflection of the unclear de jure stipulations over management responsibilities from the involved actors, described in Section 5.1 above.

Nevertheless, in addition to farmers' perceptions or formal institutional arrangements, the maintenance of irrigation systems as a whole or at different canal levels should be seen also in connection to the condition of the irrigation and drainage infrastructure.

5.2.2 Infrastructure conditions and investments

As described above, the management of irrigation systems is performed by multiple actors, although the understanding over each actor's responsibility is not clear. While looking at the maintenance of the irrigation and drainage systems, we may need to consider also how farmers perceive the condition of the system and whether investments have recently taken place (see Table 5-8). In Albania, most of the investments in irrigation systems have been carried out with the support of international donors such as World Bank, through three different rehabilitation projects spanning in time from 1994-2010. In the study areas, the last major investments have taken place at least 10 years ago. As Table 5-8 shows, 26 % the respondents perceive the conditions of the irrigation system as a whole as bad and about 50 % as very bad, whereas 9 % and about 14 % of respondents perceive the condition of irrigation systems as good and moderate, respectively. Looking at the canal level, we see that more than 50 % of respondents perceive the conditions of the canals as bad and very bad. Primary and secondary irrigation canals are perceived as less destroyed than tertiary irrigation and drainage canals. This is related to the fact that most of the rehabilitation works have been performed at the primary and secondary canal level; a fact confirmed by experts from DB and WUOs, although farmers expressed some reservations related to the quality of works. About 17 % of farmers perceive the condition of primary irrigation canals as good and about 26 % as moderate. As for secondary irrigation canals, the response rate is lower with about 9 % of farmers perceiving them as in good condition and about 20 % of them as in moderate condition.

Table 5-8: Perceived condition of irrigation and drainage systems

Perceived condition	Very good	Good	Moderate	Bad	Very bad	Don't know	P >| Z| (WUO)	P >| Z| (Region)
Irrigation System	0.66	9.21	13.82	26.32	49.34	0.66	0.0001	0.5925
Primary irrigation canal	0.66	17.11	26.32	5.92	44.74	5.26	0.0001	0.7129
Secondary irrigation canal	0.66	9.21	20.39	23.03	46.05	0.66	0.0001	0.8167
Tertiary irrigation canal	0.66	5.26	5.92	15.13	72.37	0.66	0.0146	0.8825
Drainage canals	0	1.97	12.50	25.66	59.21	0.66	0.5325	0.1536

Source: Own calculations; N=152; Values are in percentage; The reported P-values are corrected for tied ranks.

Notes: Kruskal-Wallis H-Test for governance differences in perception over irrigation system and canal conditions with 1 degree of freedom at 10 % significance level; N =76 for WUO=1: N= 76 for WUO=0.
Kruskal-Wallis H-Test for regional differences in perception over irrigation system and canal conditions with 1 degree of freedom at 10 % significance level; N =74 for Shkodra: N= 78 for Lushnja.

Meanwhile, the tertiary irrigation and drainage canals are perceived to be in worst conditions. About 72 % of the farmers perceive the conditions of tertiary irrigation canals as very bad and 15 % perceive them in bad conditions. The same pattern is observed for drainage canals, where about 60 % of farmers perceive their condition as very bad and 25 % as bad. This is surprising since the tertiary irrigation and drainage canals are, as they also perceive in large majority, to be managed by farmers themselves.

It has to be noted that these perceptions are again for the whole sample, i.e. it included both regions, Shkodra and Lushnja, and irrespective of the governance structure in charge of managing the canals. Therefore, we may again need to account for differences in perception resulting from the governance structure and from regional differences.

For this purpose, I relied again on the Kruskal-Wallis H-Test. The null hypothesis of Kruskal-Wallis H-Test is that there are no significant differences in perception over the condition of different canals between the different governance structures and regions.

For differences related to governance structure, the results in Table 5-8 indicate that the three levels of irrigation canals show significant differences. This can be explained by the fact that most of the investments in irrigation systems supported by the international donors have been conditioned with the existence or formation of local water user groups (WUO), as explained in Section 5.1.1 when analysing the institutional changes in the water sector. That indicates again the top-down, imposed nature of Albania's institutional changes in the water sector.

Another explanation pointing into this direction comes from the fact when accounting for regional differences, the Kruskal-Wallis test indicates no significant differences between the regions in perception over the condition of the different canals[42].

So far, we have created an idea about farmers' perception over the responsibilities of each actor over the maintenance of irrigation systems and conditions of the irrigation and drainage infrastructure. It was also mentioned that some investments have already been carried out with the support of international donors such as World Bank. These variables are considered to be important for the sustainnability of an irrigation system since they affect the productivity and robustness of these systems. As OSTROM (2009) argues the current productivity of

[42] Another way to look at the differences in perception is to account for specific locational characteristics of the villages across the irrigation systems (i.e. whether farmers are located at the head-end, middle and tail-end of the irrigation system), but one of the conditions to conduct Kruskal-Wallis H-Test is that groups should have equal sample size, or close to equal. In this case, the groups sample size were considerably unequal (N for head-end = 52; N for middle = 61; and N for tail-end = 39).

the system has an impact on its future management and on the inclination of its users to collectively participate in the maintenance of these systems[43].

The next step in our analysis is then to explore whether farmers actually contribute in any form (financially or labour) for the maintenance of the irrigation and drainage canals.

5.2.3 Farmers' contribution to maintenance of irrigation and drainage canals

Development of rural areas and sustainable agricultural practices are principal goals set forth in international development agendas, including the recent United Nations Agenda "Transforming our world: the 2030 Agenda for Sustainable Development" (UN, 2015). Improvement in functioning of irrigation and drainage systems is considered to be one of the key instruments to achieve these goals. It may increase agricultural production and consequently farmers' incomes and livelihoods, as well as can facilitate sustainable water management. Hence, farmers are key actors directly affected by the functioning or non-functioning of these systems. It is therefore in their interest to actively participate in the maintenance and management of the system. However, this does not always happen. In this study, we explored the financial and labour contributions of farmers to maintenance of the whole irrigation system and at different canals. In the whole sample, about 50 % of farmers (76 respondents) contribute financially to the maintenance of irrigation and drainage canals, and about 20 % (25 respondents) contribute with labour. Information on the amount of financial contributions has also been collected, but often farmers tended to overstate the amount contributed. Hence, continuing to work with the mentioned amount of financial contributions may not yield reliable results.

The next step in the analysis is to investigate whether the frequency of contributions, financial and labour, is influenced by regional differences, and particularly by the type of governance, i.e. whether the irrigation system is managed by WUO. The latter is especially important for the analysis when considering the institutional changes described in Section 5.1.

As noted there, the changes in the legal status of WUOs, which changed the WUO membership from voluntary to compulsory, had direct implications on the way contributions to maintenance is determined. As a result, a legitimate argument will be that due to these changes, the contributions can no longer be considered a measure of collective action since it does not emerge from voluntary motivation

[43] OSTROM (2009) argues that the current productivity of a resource system has a curvilinear effect on self-organization. For instance, if a water source is very abundant or exhausted users will not see a need to manage for the future (p. 420).

of farmers to contribute for maintenance of irrigation systems but it is rather imposed from outside.

Table 5-9: Financial and labour contributions by governance type

Governance	Contributions			
	Financial		Labour	
	Yes	No	Yes	No
WUO	51.32	48.68	23.68	76.32
No WUO	48.68	51.32	9.21	90.79

Source: Own calculation; N=152.

Note: Values are in percentage.

However, as Table 5-9 shows, financial contributions in WUO-governed irrigation systems are almost the same with financial contributions in non-WUO-governed systems. The financial contributions are either given to WUOs in the form of the annual maintenance fee calculated as the proportion of farmers' farm size to the total service area, or by hiring a private actor to perform the cleaning of the canals. As explained in the previous subchapter, this compulsory fee is collected at the beginning of each year so that the system is ready for the next irrigation season. Because it is not well monitored or sanctioned if the fee is actually paid it can still be seen as a voluntary contribution. On the other hand, the financial contributions in non-WUO-governed systems are performed by individual farmers on voluntary basis and go mostly for cleaning drainage canals. The costs for the latter option are calculated per linear meter, where a linear meter of canal cleaning costs about 100 Lek (about 0.70 Euro Cent). Considering these reasons, this is why financial contributions are used here as a measure for getting engaged in collective action.

Also in terms of labour contributions, presence of WUO does not considerably affect the level of contributions since the overall level of labour contributions is still rather small.

In terms of regional differences in contributions, as shown in Table 5-10, it can be noted that farmers in Shkodra contribute twice as often financially than farmers in Lushnja.

Table 5-10: Financial and labour contributions in study areas

Region	Contributions			
	Financial		Labour	
	Yes	No	Yes	No
Shkodra	63.51	36.49	10.81	89.19
Lushnja	37.18	62.82	78.21	21.78

Source: Own calculation; N=152.

Note: Values are in percentage.

Labour contributions, on the other hand, are higher in Lushnja, but on a much lower level as the financial contribution. These figures show the contributions to the system as a whole, without specifying the frequency of contributions either financial or labour at the canal level. Exploring the contributions at the canal level allows us to have a broader view on the farmers' involvement in the maintenance of irrigation systems. The contributions at the different canals are presented in Table 5-11. As can be noticed, most of the contributions have been devoted to the maintenance of tertiary irrigation and drainage canals with 25 % and about 40 %, respectively. This goes in line with the perception farmers have over their responsibility for maintenance of irrigation and drainage canals, illustrated in previous sections. Most of the contributions dedicated to tertiary irrigation canals consist of labour contributions, whereas contributions to other canals consist mostly of financial resources.

Table 5-11: Contributions to maintenance of different canals

Canal type	Percentage		Prob> |Z| (WUO)	Prob> |Z| (Region)
	Yes	No		
Primary irrigation canals	1.97	98.03	0.5611	0.0734
Secondary irrigation canals	15.79	84.21	0.0004	0.0002
Tertiary irrigation canals	25.00	75.00	0.0001	0.0399
Secondary drainage canals	6.58	92.76	0.0050	0.0987
Tertiary drainage canals	39.47	59.87	0.6207	0.6673

Source: Own calculation; N=152 for primary, secondary and tertiary irrigation canals and N=151 for secondary and tertiary drainage canals; Values are in percentage.

Notes: Kruskal-Wallis H-Test for governance differences in contributions to different canals with 1 degree of freedom at 10 %significance level; N =76 for WUO=1: N= 76 for WUO=0.

Kruskal-Wallis H-Test for regional differences in contributions to different canals with 1 degree of freedom at 10 %significance level; N =74 for Shkodra: N= 78 for Lushnja.

The form of contributions and the respective destination at the canal level are also illustrated in the correlation tables presented in Table 5-12.

Table 5-12: Correlation table for contributions at canal level

Canal level	FIN_CONT	LAB_CONT
Cont_can1	0.1419	-0.0630
	(0.0812)	(0.4410)
Cont_can2	0.3248*	-0.0461
	(0.0000)	(0.5727)
Cont_can3	0.2431*	0.4816*
	(0.0025)	(0.0000)
Cont_drain2	0.1777*	0.0816
	(0.0285)	(0.3178)
Cont_drain3	0.6308*	0.2523*
	(0.0000)	(0.0017)

Source: Own calculation; N=152.

Note: The values in the brackets indicate the p-value. The significance of the correlation is at (0.05) level.

As can be noticed, financial contributions are positively correlated with contributions to canal level below the primary canal, including both secondary irrigation and drainage canals and tertiary irrigation and drainage canals.

With respect to labour contributions, it is shown that labour contributions are more correlated to contributions to canals at the field level, including both types of canals, tertiary irrigation and drainage canals.

After having investigated the occurrence of contributions and explained why these variables are relevant and can be used as a measure that indicate collective action for maintenance of irrigation and drainage canals, the next step is to analyse the factors that determine the propensity of farmers to contribute or not to maintenance of the irrigation systems. The analysis will be performed econometrically by means of a logistic regression model.

5.2.3.1 Specification of econometric model

An important component of the econometric analysis is the specification of the model that would allow the researcher to measure variables and infer causal relationships between them (GREENE, 2003). To analyse the data, I estimate a binary choice model explaining the contribution to maintenance by socio-economic characteristics, by physical characteristics and by institutional attributes. This quantitative approach involves two specifications modelled for analysing the likelihood of farmers contributing financial and labour resources for canal cleaning and maintenance as a function of socio-economic, physical and institutional factors. Our focus will be on the contributions of farmers to canal cleaning and maintenance, both financially and with labour. I do not focus at a particular canal level, but consider the contributions to the system as whole. The reason for this is that – as we noticed above – farmers do often contribute to more than one canal, financially, with labour and in both ways. Both dependent variables – financial and labour contributions – are constructed as binary variables to indicate the occurrence of each form of contribution, as explained above. The econometric analysis will be performed by logistic regression model, given the binary nature of our dependent variables. The first specification considers financial contributions as a function of socio-economic characteristics, namely: between-village land variation, number of plots each interviewed farmer possesses, levels of trust among farmers, distance to market, water scarcities, wealth of the household, and size of the community. I also control for regional differences. The same logic and procedure was applied for the other specification accounting for labour contributions.

There are other ways to measure collective action through contributions. One way could for instance be to use the percentage of water contributions collected by responsible authorities of irrigation systems (see ARARAL, 2009). However, this approach focuses on organization scale and does not capture individual farm specificities. By collecting household data from various villages we are able to capture also differences in institutional attributes and to explore accordingly the differences across villages.

In addition, because of the methodological approach concerning the study area selection and the fact that some of the variables are calculated on the village level, I use clustered standard errors which are adjusted for 12 villages to account for village differences.

a) Socio-economic attributes

The variable **LAND** is one of the main variables capturing the outcomes of Albania's land reform. It is used as proxy for measuring the impact of land (in)equality within each village on the likelihood of households to contributions to canal maintenance. As mentioned in Chapter 2, Albania's land reform was based on egalitarian principles with the main aim to provide food security for the rural population, as well as to revitalize the agricultural sector. The land inequality has been measured using the Gini coefficient index. Gini coefficient was primarily developed to measure income inequality, and later used as an instrument to measure also land inequality (DEININGER & SQUIRE, 1998). One would logically expect some land transactions after 20 years from the implementation of the reform. The data and also literature suggest (see, for instance, DEININGER, SAVASTANO, & CARLETTO, 2012) that most of land transactions take place in the rental market and in almost all cases occur within the village (between relatives that are absent or other fellow villagers who are involved in off-farm work). Therefore, to get a more realistic picture of current context, the farm size has been calculated together with rented land.

Another outcome of the Albanian land reform is land fragmentation. Land fragmentation in ownership in Albania has been viewed as a key factor determining land use practices (STAHL, 2010) and often as an obstacle to development of agriculture, with impacts also on irrigation and drainage systems (LUSHO & PAPA, 1998). However, the impact of land fragmentation on collective maintenance of irrigation systems is not straightforward. BARDHAN (1993) argues that it may sometimes have a positive impact on cooperation, since some large farmers may have plots in less water-accessible location, and then they may have an interest to cooperate. We therefore consider this variable important for controlling for the impact of land (in)equality brought about by the land reform. This variable is measured simply as the number of plots **(PLOT_NUM**) each interviewed farm possesses. Our expectation is that the number of plots will negatively affect the probability of farmers to contribute to canal cleaning and maintenance.

TRUST is another very important variable that may have a significant impact on whether farmers contribute or not to maintenance of the irrigation and drainage canals. Communities that are tied together and interact in common social environments through sharing of common habits and norms and thereby developping reciprocal trust are expected to have higher participation in collective action (BALAND & PLATTEAU, 1996). Furthermore, the marginal costs of getting together are lower in such settings (MEINZEN-DICK et al., 2002). Sharing of common norms and habits generally occurs in settings where people have been living for a long time and interact with one another continuously (OSTROM, 2000). The important role of trust for collective action in natural resource management has been found also in transition economy contexts. In a study on institutional changes in the irrigation sector in Bulgaria, THEESFELD (2005) found that trust is one of the main determinants that affect collective action for irrigation management. In the work at hand, trust is measured through an index derived from ten opposing statements addressing how much they trust each other in the community[44]. The answers are measured in a four-range Likert scale (1=very much agree; 2=agree; 3=disagree; 4=very much disagree). To derive the index, a factor analysis has first been performed identifying the factors with the highest loading and afterwards calculated as ((C+E+F+G+H)-4/16), where (-4) stands for the minimum value and (16) for the maximum value, whereas the letters (C, E, F, G, H) correspond to the statements with the highest value in the factor analysis[45].

An additional socio-economic factor considered here is wealth. Collecting information on the amount of incomes turned out to be a challenge given that

[44] A similar approach in constructing a trust index is found in JANSSEN et al. (2012).
[45] The full list of statements is included in Annex II.

farmers were reluctant to reveal their real income. Another way of measuring wealth is to construct an index by using factor analysis accounting for the presence of agricultural equipment (such as machinery and tractors) and animals (such as cattle, sheep, or goats) (see HAYES, ROTH, & ZEPEDA, 1997). However, since almost all households in the sample own in average one or two cows that mostly serve subsistence needs, and only four households in the sample own sheep and goats, a reliable indicator to perform the analysis is to account for the agricultural machinery the household possesses, denoted as **MACHINERY**. The presence of agricultural machinery indicates also the agricultural orientation of the farm since tractors and other agricultural equipment are capital-intensive investments.

In addition to individual endowments, community characteristics represent other important constraints for human choices. Number of users **(NUMUSER)**, for instance, is argued to affect collective action differently. Some argue that small group size is positively related to collective action (BALAND & PLATTEAU, 1999; OLSON, 1965). Others argue that also large groups can collective cooperate in a successful manner (ISAAC et al., 1994). In this study, with number of users I mean the number of households living in the village indicating the size of the community. Distance to market, denoted as **MARKET**, is another variable which may have an impact on collective action. It is a measured as the distance in km from the farm to the closest market centre where the farmer takes the produce. Also for this variable, no consensus exists on the direction of the effect. One argument is that farmers distant from market centres may face high transaction costs to bring the produce to the market, reducing this way their incentive to fully engage in agriculture, thereby affecting also their incentives to engage in collective action for maintenance of the irrigation systems. The other argument views the closeness to market distance as a proxy for exist options, with discouraging effects on collective action (ARARAL, 2009). In this case, I expect a negative impact of distance to market on contributions.

b) Physical characteristics

Physical characteristics of the resource play also an important part in shaping the incentives for cooperation and collective action. Resource scarcity is one of them and its impact on collective action is determined by the degree of scarcity. For instance, AGRAWAL (2002) and BARDHAN (1993b) suggested that resource scarcity and collective action are related in a curvilinear manner, that is, cooperation is more difficult when water is either abundant or extremely scarce. The same was reported by FUJIIE et al. (2005) in their study of irrigation association in the Philippines. However, measuring water scarcity is not easy because of high costs and difficulties in accurately assessing water demand and supply (MEINZEN-DICK et al., 2002). A common way to measure resource scarcity is the location in the system; whether at the head-end, middle or tail-end. It is assumed that the motivation of head-enders to engage in collective action for maintenance of canals is low due to continuous availability of water. The downgrading conditions of the infrastructure may consequently affect the availability of water for tail-end farmers. As result, the prospect that tail-end farmers will engage in collective maintenance of the canals reduces. These variables capture system-scale water scarcities but not necessarily water scarcities in the community, since even at the head-end located villages might be farmers facing water scarcity, for instance, due to the location of the farm land which could be distant from the water source. Hence, in order to capture within-communities water scarcity, farmers are asked directly to indicate how much of their water needs for irrigation is met. This variable is denoted **WATNEEDS** and is measured in a six-range Likert scale where 1= more than I need; 2 = all my needs; 3 = ¾ of my needs; 4 = ½ of my needs; 5 = ¼ of my needs; 6 = nothing from my needs. However, although fulfilment of water needs may tell us a great deal about scarcities, farmers at the tail-end may face even more due to their location. Therefore, in order to capture also the water scarcity at the system scale, a dummy variable (**TAIL)** has been created, with 1 indicating the presence at the tail-end of the system and 0 otherwise.

The effect of the different variables on farmers' contributions may depend also on the regional characteristics of the study areas. In order to account for these differences, a dummy variable, denoted **SHKODRA**, has been constructed.

c) Institutional attributes

Although farmers are the main users and beneficiaries of irrigation systems, their degree of involvement in maintenance and other management-related activities depends on the governing authority responsible for systems' management. Generally, the responsibility and authority to operate and maintain irrigation systems rests either with the government, through their agencies at different levels, or it is transferred to farmer user organizations. To account for the governance structure, we constructed a dummy variable denoted **GOVERNANCE** that indicates whether irrigation system is under the control of farmers or the government irrigation agency. By farmer controlled systems we mean systems which are formally transferred to local users and are somehow still active, while with government agency we mean, the systems which have no active formal local organization, given that then these systems are de jure automatically controlled by the government. We have farmers' controlled systems coded here as 1, and 0 the opposite. A large body of empirical literature emphasizes the advantages that come with transfer of management rights over irrigation systems and other common-pool resources to local user groups (Araral, 2011; Ostrom, Lam, Pradhan, & Shivakoti, 2011). We also expect a positive effect of WUO on farmers' contributions for maintenance and canal cleaning.

5.2.3.2 Descriptive statistics

Table 5-13 provides the summary statistics of the variables used in the econometric analysis. We can see a difference in average financial and labour contributions in the whole sample. Half of the respondents (76 out of 152) have contributed financially to cleaning and maintenance of different canals in the irrigation system, while only about 15 % have contributed labour. As reported above, most of the financial contributions have been allocated to cleaning and maintaining the tertiary irrigation and drainage canals and the secondary irrigation canals; activities which cannot be simply performed manually but require some mechanization such as excavator. These kinds of activities at this canal level need not be performed annually, though. According to experts from DBs and farmers themselves, cleaning of canals above the field level should normally be performed every three years. The data suggests that more than 70 % of the financial contributions have been made during the previous year and three years before, in reference to the time the survey was carried out in 2013. In more than 70 % of the cases, the canal cleaning works have been performed by private actors and the rest by the WUO.

Table 5-13: Description of variables

Variable	Description of variable	Mean	SD	Min	Max
Dependent variables					
FIN_CONT	Dependent variable measuring whether farmers contribute financially to canal maintenance; 1 denoting occurrence of contribution and 0 otherwise.	0.5	0.50	0	1
LAB_CONT	Dependent variable measuring whether farmers contribute labour to canal maintenance; 1 denoting occurrence of contribution and 0 otherwise.	0.16	0.37	0	1
Household level variables					
PLOT_NUM	Number of plots per household farm.	2.83	1.096	1	5
TRUST	It is an index calculated by aggregating survey questions relating to trust and the community, using a Likert scale (whether in general the person agrees or disagrees with certain statements, assigning 1 point for Strongly agree, 2 points for agree, 3 points for disagree, 4 points for Strongly disagree, using this formula (C+E+F+G+H)-4/16)	0.39	0.17	0.06	0.81
MACHINERY	Possession of agricultural machinery.	0.22	0.41	0	1
WATNEEDS	Ordinal variable measuring farmers' perception on fulfilment of water needs, indicating (1=more than I need; 2=all my needs; 3=3/4 of needs; 4= ½ of the needs; 5=1/4 of needs; 6=none of the needs).	4.17	1.67	1	6
Village level variables					
LAND	Gini coefficient of farm size at village level.	0.25	0.07	0.16	0.43
MARKET	Distance from farm to the market measured in km.	16.29	9.72	1	35
NUMUSERS	Number of households living in the village.	329.21	184.31	135	694
TAIL	Village is located at the tail-end of the irrigation system.	0.26	0.44	0	1
Regional level variables					
GOVERNANCE	Dummy variable indicating that the irrigation is transferred to Water User Organizations; 1 indicates transfer of the system to WUO and 0 otherwise.	0.50	0.50	0	1
Shkodra	Dummy variable to control for regional differences.	0.48	0.50	0	1

Source: Own calculations; N=152.

Note: The number of observations for TRUST = 150 due to missing values.

Meanwhile, labour contributions have been mostly carried out at tertiary irrigation canals and tertiary drainage canals. The amount of labour contribution carried out in a year for canal cleaning and maintenance ranges from one day to 30 days. The average Gini coefficient for land (in)equality between the villages is 0.25, with minimum value 0.16 and maximum value 0.43. The number of plots each interviewed farmer owns follows the national trend of land fragmentation of an average 3 plots per farm (CUNGU & SWINNEN, 1999). Meanwhile, the index of trust as an important explanatory variable to account for social characteristics of the communities indicates moderate levels, with an average value of 0.39 out of a minimum value of 0.06 and maximum value of 0.81.

Other social context variables such as village size capturing the number of users and distance to market show also some variation. The size of the villages varies from 135 households to 694 households, with an average size of 329 households, whereas the average distance from the farm to the closest big market centre is about 16 km.

Market centres are usually located in urban centres which in our case are the cities of Shkodra and Lushnja. Our data show that the average distance to the market in Shkodra region is 20 km, whereas the average distance to the market in Lushnja region is 12 km.

Other variables capturing the governance structure in charge of irrigation systems, water scarcity through positioning in the irrigation system and the regional variable (Shkodra) represent the methodological reasoning for the selection of study sites. In 50 % of the sample, the irrigation systems are officially managed by Water User Organizations and the rest is under government control, whereas the households located at tail-end of the irrigation systems represent 26 % of the sample. The other variable capturing water scarcity – water needs – shows that in average only half of farmers' needs are fulfilled. Meanwhile, the variable capturing wealth and the agricultural orientation of the household shows that 22 % of the sample possess a tractor and/or other agricultural equipment.
The regression results of how all these factors affect the likelihood of farmers to contribute financially and with labour to cleaning and maintenance of canals will be discussed subsequently.

5.2.3.3 Regression results for financial and labour contributions

The explanatory variables accounting for the outcomes of land reform, namely land fragmentation and land inequality, show different results in terms of their effect on labour and financial contributions to canal cleaning and maintenance.

Table 5-14 presents the regression results for the probability of farmers to contribute to maintenance and cleaning of irrigation and drainage canals in the two study areas. As discussed earlier, the econometric model used for the analysis is logistic regression, which is a non-linear model with binary depended variables (see Chapter 4). It estimates the probabilities of an outcome, with values of (Y=1) indicating the occurrence of contributions either financial or with labour, and (Y=0) indicating the opposite. Since the aim of the analysis is to investigate how the above socio-economic, physical and institutional characteristics determine the participation of farmers in maintenance activities, the results are not interpreted in terms of the magnitude of the coefficients, but rather on the significance and direction of the effect that explanatory variables have on the dependent variables. The Wald Chi-square statistics with 10 degrees of freedom and the associated probability indicate that at least one of the regression coefficients in the model is not equal to zero, which implies that our explanatory variables have an impact on the dependent variables in both models. In order to test how good the models fit the data, Pearson's, and Hosmer-Lemeshow's goodness-of-fit tests have been conducted. Both tests indicate that the models fit the data in both specifications. Also, the classification tables for models prediction show 70.67 % correctly classified for financial contributions and 82.67 % for labour contributions. These tests suggest the models have been specified correctly and that results can be considered plausible. To test for multicollinearity of explanatory variables, the variance inflation factor (VIF) test has been conducted. The mean VIF of 1.77 indicates that there is no collinearity among the variables (i.e. explanatory variables are not linearly related to each other). The statistics for respective tests are shown in Annex I.

The explanatory variables accounting for the outcomes of land reform, namely land fragmentation and land inequality, show different results in terms of their effect on labour and financial contributions to canal cleaning and maintenance.

Table 5-14: Results of logistic regression for probability of financial and labour contributions

VARIABLES	**FINANCIAL**	**LABOUR**
PLOT_NUM	0.046	-0.625***
	(0.203)	(0.188)
TRUST	-2.520**	-1.031
	(1.204)	(1.524)
MACHINERY	1.298***	1.304
	(0.378)	(0.868)
WATNEEDS	-0.103	-0.793***
	(0.210)	(0.203)
LAND	-5.653**	11.401**
	(2.396)	(4.780)
MARKET	-0.116**	0.145**
	(0.047)	(0.058)
NUMUSER	0.003**	-0.004
	(0.001)	(0.003)
TAIL	0.154	-0.148
	(0.551)	(0.385)
GOVERNANCE	0.293	-0.832
	(0.637)	(0.796)
SHKODRA	2.152***	-1.480**
	(0.540)	(0.719)
Constant	2.151*	0.041
	(1.194)	(1.585)
Observations	150	150
Log ps.	-80.934222	-48.924856
Wald chi2	150.67	304.24
Prob> chi2	0.0000	0.0000
Pseudo R2	0.2215	0.2761

Source: Own calculations based on field survey carried out in 2013.

Note: Robust standard errors adjusted to 12 village clusters in parentheses; *** Significant at 0.01 probability level, ** Significant at 0.05probability level, * Significant at 0.10 probability level.
The values reported in the regression table refer to the coefficients and standard errors in parenthesis.

The first outcome of the land reform (land fragmentation), measured as the number of plots per farm (PLOT_NUM) shows a significant negative impact on labour contributions but no significant impact on financial contributions. This result comes as no surprise since the land parcels pertain to different land quality and different distances from the homestead. As explained previously, the quality aspect of land distribution was based on different categories of soil and whether land is under irrigation. Therefore, contributions, especially- labour, are mostly addressed to the more productive plots and which are closer to the homestead. This result confirms the hypothesis (H2-1) raised in the theoretical chapter that fragmentation of land into various dispersed plots has a negative impact on farmers' contributions to canal maintenance.

Meanwhile, the other land reform outcome (land inequality) measured by Gini coefficient at the village level, denoted LAND, shows opposite effects on labour and financial contributions. Results suggest that in communities (villages) with a more unequal land distribution, farmers are more likely to contribute labour and less likely to contribute financially. This result confirm the hypothesis (H2-2) raised in the theoretical chapter that land (in)equalities brought about by Albania's land reform have no straightforward impact on farmers' contributions to maintenance of irrigation and drainage canals.

One logical interpretation for this result is that it reveals lack of economies of scale and the subsistence orientation of the farm. The lack of economies of scale is, among other factors, conditioned by the relatively small farm size that derived from the distributive approach of land reform. As noted earlier, the average farm size in the study area is about 1.6 ha, falling into the country-scale range of about 1.5 ha. Also, as it will be illustrated in Section 5.3, the agricultural practices undertaken by farmers are generally characterised by high crop diversification, which in addition to meeting household's subsistence needs serves also as a coping and adaption strategy to deal with adverse events.

Another argument that can be used to explain the negative impact of land inequalities on financial contributions is related to the costs of canal cleaning and maintenance. As explained earlier, many farmers do also privately undertake maintenance works by hiring private parties to carry out these works. In these cases, the costs of canal cleaning were determined by the length of the canal adjacent to one's land, i.e. the bigger the land owned/used, the more costly will be for the farmer.

Several studies focused on the development of Albania's agriculture point out the scarce use of machinery due to high costs of services offered by third parties and limited access to credit to invest in farms (also in machinery) (DEININGER et al., 2012; JOJIÇ et al., 2009; WORLD BANK, 2007). Consequently, the extensive use of machinery and technology has been replaced by intensive use labour force (STAHL, 2010). This points to a substitution effect of these factors of production.

In terms of other socio-economic attributes, the variable TRUST shows a negative significant effect on financial contributions but shows no significance for labour contributions. This is logical since most of labour contributions are carried out at the tertiary irrigation and drainage canals, whose maintenance affects only the farm owner. Financial contributions on the other hand are carried out also at higher level canals whose operation affects all farms sharing the same canal. These results confirm the hypothesis (H2-3) and fall in line with empirical findings on management of irrigation systems and theoretical assumptions on collective action that low levels of trust are disadvantageous to collective action for the management of irrigation systems (JANSSEN et al., 2012; OSTROM, 1990; WADE, 1988).

Focusing on a post-socialist context, THEESFELD (2004) found also that low level of trust is one of the major constraints on collective action in Bulgaria's irrigation sector.

Finding relative low levels of trust in a post-socialist transition context is no surprise, though[46]. In Albania, the World Values Survey for the third and fourth wave (1998 and 2002) show that about 24.3 % of respondents in 1998 and 23.2 % in 2002 think that most people can be trusted, whereas 66 % of respondents in 1998 and 72 % in 2002 think that you need to be careful with other people so that they do not take advantage of you[47]. Also, the level of the voluntary civic commitment is found to be rather low in Albania (AIIS, 2010), indicating that the issue of trust is not an exclusive problem of natural resource management.

The other variable accounting for social characteristics of the communities, size of the community (NUMUSER), measured in number of households, shows a significant positive effect for financial contributions and no significance for labour contributions. That means that larger communities do contribute more financially and less with labour. This result goes however against the hypothesis (H2-4) raised in Chapter 3 that larger user groups are more likely to contribute less resources for maintenance of irrigation and drainage canals than smaller user groups.

The theoretical expectation for both models would be that contributions to the provision of public/collective goods groups – canal maintenance in this case – are inversely related to group size. In his seminal work, OLSON (1965) posits that the provision of public goods will be more difficult unless the size of the group is small. However, many empirical studies on CPR management and field and lab experiments on public good provision point out different effects of group size on public good provision and free-riding (see AGRAWAL & GOYAL, 2001; BARDHAN, 2000; DAYTON-JOHNSON, 2000; ISAAC et al., 1994; OSTROM, 1990). An explanation for these results is that larger communities receive more attention by government agencies and water user groups. In Albania, larger villagers are usually the administrative and/or important economic centres of the communes (*Komuna*).

[46] See for example ROSE-ACKERMAN (2001) for an analysis of trust in Central and Eastern Europe and Sapsford & ABBOTT (2006) for eight former Soviet countries.

[47] The World Values Survey can be found in: http://www.worldvaluessurvey.org. Albania is not included in the last two waves of the survey.

Similar results have been reported also on irrigation systems in India (see also MEINZEN-DICK et al., 2002).

Market distance (MARKET), on the other hand, goes partly against the expectations raised in this work (H2-5) showing opposing results for both types of contributions. It has a significant negative effect on the likelihood of farmers to contribute financially for canal maintenance and cleaning and a significant positive effect for labour contributions. The negative sign for financial contributions shows that more distant villages are likely to contribute less financial resources and more labour. First, these results may be explained by the employment opportunities (exist options) provided by the proximity to the cities of Shkodra and Lushnja. Both these cities are among the most important economic and social centres of the country. The minimum travelling distance in the study areas is 1 km, whereas the maximum distance is 35 km. And second, the positive effect of market distance to labour contributions may be explained by the availability of labour force since it may be more difficult and costly for farmers in the areas more distant to the these cities to find off-farm employment opportunities. These two factors influence also the capital allocation in the farm, with farms closer to market centres being more capital intensive and market-oriented, and the ones farther away being more labour-intensive. Most of the greenhouses and agricultural machinery are found in villages that are 1-20 km distant from the two market centres. This is reflected also on the effect of the variable capturing wealth of the household. The variable MACHINERY has a positive significant effect on financial contributions and no significant effect on labour contributions.

In terms of physical attributes, although the proxy variable for system-scale water scarcity (TAIL) shows no significance, the variable capturing farmers' perceived water scarcity (WATNEEDS) has a significant negative impact for labour contributions, confirming in this way the hypothesis (H2-6) raised in Section 3.5. One straightforward implication from this is that in general there are water scarcities across the entire system and that farmers perceive that their water needs are not met. The result confirms the hypothesis that water scarcities have a negative impact on farmers' contributions to maintenance of irrigation and drainage canals. This finding goes in line with the theoretical prediction that water scarcity is related to cooperation in a curvilinear manner, i.e. when the resource is abundant or very scarce, collective action is more difficult to achieve (see Section 3.3.2).

Meanwhile, contrary to the expectations (H2-7), the variable capturing institutional attributes – the presence of WUOs – shows no significant impact on both types of contributions. One would normally expect some impact of governance structures on collective action, either negatively or positively. As the officially recently created WUOs (in two of the four case study regions (see Table 4-3, Chapter 4) have compulsory membership and additionally a compulsory payment of maintenance fee, these empirically quantitative results confirm, what has been stated in the chapter beforehand – that the WUOs do only exist on paper and their existence is not relevant for the daily actions of the water users.

On the other hand, the variable capturing regional differences (SHKODRA) shows significant effect for both types of contributions, although in opposite directions. The interpretation for these results is that farmers in SHKODRA region are more likely to contribute financially to maintenance of irrigation and drainage canals. This may be explained by the rainfall differences between the two regions and susceptibility of Shkodra region to floods. Shkodra region has the highest rainfall levels country-wide, reaching up to 3000 mm annually, though most of the rainfall occurs from October to March. Due to these amounts of rainfall, this area is often threatened by excessive water accumulation during heavy-rains, making the functioning of the drainage canals necessary for continuation of agricultural activities. As shown earlier, a considerable part of the financial contributions is given for the cleaning of drainage canals.

5.3 Resilience and adaptation to floods

In the previous section, I presented and discussed the results of the econometric analysis on the impact that several socio-economic, physical and institutional factors have on the likelihood of farmers to engage in collective action for the maintenance of irrigation and drainage canals. This is however only a part of the story, since farmers' decisions to engage in collective action for the management and maintenance of the common good depend also on the occurrence of unpredicted adverse events induced by forces beyond their control, such as floods. That requires that farmers adapt their agricultural practices and livelihoods to the emerging conditions. The adaptation strategies and activities together with the ability of communities to self-organise could increase the resilience of the social-ecological system in dealing with external shocks that could threaten the social and economic infrastructure of the communities (Adger, 2003).

This section presents the results of different adaptation activities and strategies undertaken by farmers and other actors when facing floods. In the theory chapter, I already mentioned that these activities can be anticipatory or responsive and autonomous and planned, depending on the purpose, time, decision-making and scale of adaptations.

However, before analysing these activities and strategies, I will first provide a description of the hydrological environment and a short historical account of occurrence of floods in the study area. That will be useful not only for placing the analysis in a particular physical and environmental context, but also to show the changes that have happened in the natural system over time.

As pointed out in the SES framework introduced in Chapter 3, the Related Ecosystems (ECO) component plays an important role in understanding the management of natural resources, adaptations and self-organization of local communities since it has an impact on the socioeconomic, institutional and ecological setting. Speaking in the SES framework language, adaptation strategies and self-organization capacities are the interactions (I) of farmers (in terms of investments, agricultural activities), of higher governance structures (investments in drainage systems) and the deliberation processes mediated by governance structures (GS1 and GS2) in place that lead to certain outcomes (O) such as resilience of the system and of the community and accountability of the governance structures.

More concretely, I will show the strategies that farmers have adopted in terms of agricultural practices and then I will analyse the community's self-organization mechanisms for dealing and coping with floods. This will point out also the role of the different governance structures that have been involved in facilitating and undertaking adaptation actions against flooding. This is important for exploring whether the governance and management of these systems is performed in an adaptive manner and how much they contribute to the resilience of the social-ecological system in place.

The analysis is based on qualitative data collected from in-depth and semi-structured interviews with farmers and key informants from the affected communities, as well as on the utilization of secondary data from reports, project documents and other online sources. The data from in-depth interviews have been mostly transcribed into Word document and organised in a tabular form based on defined categories and themes. The answers were categorised under core themes related to past experiences of farmers to floods and drought, governance of irrigation and drainage systems and social resilience of the communities. The most relevant answers were displayed in the form of "vignettes" to emphasise and elucidate the actions and perceptions of the respondents. Photographs have also been used to illustrate the outcomes of certain adaptation activities and strategies. Meanwhile, the data from semi-structured interviews have been entered into an Excel sheet and exported to the STATA statistical programme. The results have been displayed in graphs and tables that and processed in both packages. Also, data from the hydropower stations in Vau i Dejës showing water variability have been processed using the Excel package.

5.3.1 Hydrographical characteristics of the area

Before discussing the adaptation strategies and actions undertaken by farmers and government agencies, it may be necessary to bring back the attention to the hydrological setting of the area not only as a crucial element of the ecological system, but also for its implications on water governance and institutional arrangements.

As presented in Chapter 4 (Section 4.3.2.1), Shkodra region is one of the most water abundant area in the country. In hydrographical terms, it is located in the Drin-Buna River Basin and crossed by three major rivers (Drin, Buna and Kir), as well as it is home to the largest lake on the Balkan Peninsula, Shkodra Lake. Shkodra Lake is of transboundary nature and it is shared between Albania and Montenegro. The lake area varies between 353 km^2 in dry periods and 500 km^2 in wet periods (at maximum level, 335 km^2 is in Montenegro and 165 km^2 in Albania) and the drainage area of the lake is about 5,500 km^2 (4,470 km^2 in Montenegro and 1,030 km^2 in Albania) (WORLD BANK, 2006a). Shkodra Lake is fed mostly by rivers flowing from Montenegro such as Moraca, Crnojevica, Orahovstica, Karatuna and Baragurska, as well as by smaller rivers in the Albanian side such as Vraka (WORLD BANK, 2006a). Meanwhile, the waters of the lake are discharged into the Adriatic Sea through Buna River. Buna River is 44 km long and has a mean annual discharge capacity of 680 m^3/sec, out of which 320m^3/sec are from Buna River itself and 360 m^3/sec from Drin River (HASA, 2008). Drin River is the largest river in Albania and consists of two tributaries, Black Drin (Drini i Zi) and White Drin (Drini i Bardhë). Black Drin flows from Lake Ohrid in FYR of Macedonia, whereas White Drin flows from Kosovo, and both tributaries meet in northern Albania, near the city of Kukës. After reaching the Shkodra area, Drin River discharges into the Adriatic Sea in two directions. A smaller branch of Drin flows directly into the Adriatic Sea, near the city of Lezhë 25 km from Shkodra City, whereas the main branch (known as Great Drin) joins Buna River near the city of Shkodra, 1.5 km from the lake's outlet. It is reported that, earlier, Drin River discharged directly into the Adriatic Sea, but the floods of 1850s diverted it into the Buna River (see SCHNEIDER-JACOBY et al., 2006; BOSKOVIC, 2004 cited in WORLD BANK, 2006a). Such a diversion had two straightforward impacts on the hydrological regime; first it raised Buna's riverbed and consequently the lake level with several meters due to the increased deposits of sediments, and second, it often impedes the water discharge from Shkodra Lake (causes a reverse-flow) due to the increased flow of Drin River (SCHNEIDER-JACOBY et al., 2006). According to a diagnostic analysis on Lake Shkodra procured by the World Bank (WORLD BANK, 2006a), this phenomenon occurs mostly in the period from December to February, but may also occur during the other months, depending on the water released from the three main hydro-power stations located upstream in the Drin River. As noted in previous chapters, the construction of HPPs on Drin River was done mainly for energy production, as well as for flood protection purposes. The first HPP (Fierza) in the upper part of Drin River has a dam of 167 meters high forming Lake Fierza that contains a total water volume of 2.7 billion m^3. The maximal allowed water level is 296 meters above sea level (a.s.l) and the combined maximal discharge capacity (from turbines and safety tunnels) is 3,225 m^3/sec. The second HPP (Koman) has a dam of 115 meters high that forms Lake Koman with a total water volume of 500 million m^3. The maximal allowed water level in the lake is 175 meters a.s.l. and a combined discharge capacity of 3.600 m^3/sec. The third HPP (Vau i Dejës) which is only 18 km away from Shkodra city has a dam of 60 meters high and forms Vau i Dejës Lake with a total water volume of 580 million m^3. The maximal water level in Vau i Dejës Lake is 76 m a.s.l. with a combined discharged capacity of 6.900 m^3/sec (KALAJA, 2011; KESH, 2010). In 2012, a forth HPP (Ashta) has been built below Vau i Dejës. Ashta HPP is of a run-of-the-river type operating with a very limited storage capacity, making it dependable on the water released from the upstream HPPs.

Although the construction of HPPs on Drin River have significantly contributed to the reduction of water levels flowing into Buna River, the large amount of water contained upstream poses serious risks for the downstream communities if excess water is discharged from the hydro-power plants (WORLD BANK, 2006a). The accumulation and discharge of waters from the above HPPs is dependent on the variabilities of water flows entering the reservoirs, as illustrated in Figure 5-2 in the subsequent section.

Also, due to the low gradient of the riverbed, Buna River has a weak transport and erosive capacity to remove the accumulated sediments that contribute to the rise in the water level in the river and often to flooding of Shkodra fields. According to SCHNEIDER-JACOBY et al. (2006), before intensive drainage and melioration of the area, almost 50 % of the whole Shkodra region was regularly flooded. Most of the melioration works and construction of the drainage infrastructure were carried out during communism. The drainage infrastructure consisted mainly in construction of embankments along Buna River, drainage canals and pumping stations to drain the Shkodra plain (MEÇAJ, 2003). However, there are still parts of Buna River that are not covered by embankments affecting in this way the transport capacity of the river. The maximal discharge capacity of Buna River varies from about 1500 m^3/sec in sections of the river that are not protected by embankments to 2,200 m^3/sec in the protected parts (KALAJA, 2011). Additional flood protection and melioration measures consisted in construction of two pumping stations to drain the Shkodra plain, namely Ças and Velipoja pumping stations (hidrovoret).

These pumping stations are currently functional but need – like many other drainage assets constructed during communism – rehabilitation and renewal of many electromechanical parts (pers. comm. with Shkodra DB specialist).

5.3.2 Historical occurrence of floods in the study area

As noted in the previous chapters, Dajç (Bregu i Bunës) study area is located by the banks of Buna River, and as such, the area has historically been threatened by floods. The reported floods date back to the end of 19th century (years 1848, 1858 and 1896), causing significant negative impacts to the affected communities (EURONATUR, 2009; SCHNEIDER-JACOBY et al., 2006). The flood of 1896 was estimated with a flow of 7,000 m^3/s, which is enormous for a catchment of this size (WORLD BANK, 2006a). Several floods have been recorded also during communist era. During December 1962, the waters flooded 2000 ha in the Shkodra plain, including the villages under investigation (MEÇAJ, 2003: 52). As noted earlier, for purposes of flood protection and mostly for energy generation, the communist government built three large dams on Drin River during the 1960s and beginning of 1970s. Despite the construction of these dams, several floods still occurred. For example, during the years 1970 and 1971, about 5000 ha were flooded in Shkodra plain. That was caused from heavy rains that made the water level of Drin and Buna Rivers raise beyond the critical point (MEÇAJ, 2003: 45).

Other floods have occurred during the transition period after the fall of communism. Based on a mapping exercise on the extent of areas flooded by Buna River conducted by SCHNEIDER-JACOBY et al. (2006) during November 2003 and January 2004, it is reported that nearly 9,000 ha were regularly flooded. Apart from high precipitation levels and increase in Buna's riverbed, the lack of proper maintenance of drainage canals since the demise of agriculture cooperatives has been viewed as another cause of the frequent floods (LUSHAJ et al., 2005).

During the flooding of 2009-2010, large parts of the Shkodra plain were flooded causing serious damages to local communities in terms of agricultural produce and livestock. An estimated 14,500 ha of farmland and settled areas including the city of Shkodra, were flooded, including 4,600 houses and causing the evacuation of some 12,145 people, and 14,646 heads of livestock (KALAJA, 2011). In late 2010 this region faced an even bigger flooding. Houses and lands remained under water for a significantly long period of time, about 40 days. As explained by one of the specialists of Shkodra Regional Agricultural Office, the surface of agricultural land in the study area (Dajç Commune) covered by water amounted to 1500 ha out of 2683 of the commune's agricultural land. That necessitated also the evacuation of many of the villages. Local people and experts attribute the recent floods to mismanagement of the Drin cascade from the hydropower authorities. Too much water was accumulated in the reservoirs in order to increase the energy production at a later time, which could have alleviated costs on the government from energy imports, so needed to meet the country's demand for energy. This can be considered a form of adaptation from the energy sector point of view, but the unusual and unexpected amount of rain that fell during late autumn months necessitated the release of large volumes of water, heavily impacting downstream communities. Although no exact figures over the amount of water released from

HPPs were made available due to the sensitivity of the issue[48], a farmer describes the severity of floods in the following way:

> *"A friend of mine working at the hydro-plant, when I asked him in confidence about the amount of water released, he told me: You know what?!! If you would know the amount of water that was released, you will start crying and be terrified even now that is dry".*

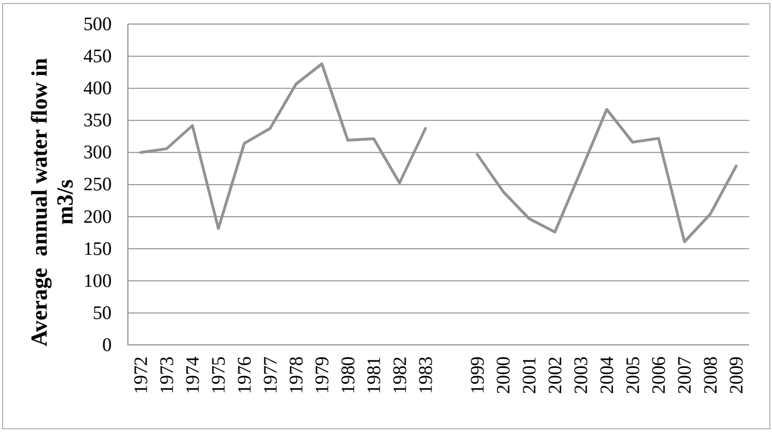
Such an action clearly shows uncoordinated water resource governance across levels. As OLSSON et al., (2004) point out, the collaboration of a diverse set of actors operating at various social and ecological scales in multi-level institutions and organizations is critical for governing natural resources and ecosystems in an adaptive manner. Often adaptive actions taken at a certain scale might be in contrast to those taken at other scales. A country relying on hydropower for energy security, for instance, may need to adapt its production and management to trends in water availability (LEHNER et al., 2005). As the graph below Figure 5-2 illustrates, Albania has high variability of water flows, whose unpredictability will only increase due to the expected climate disturbances in the coming years. These disturbances are mostly related to precipitation variations and temperature increases and the energy sector will significantly feel the consequences (MEFWA, 2009; WORLD BANK, 2011). It has to be stressed, though, that one need to distinguish between different types of variability, since they can have a differrent impact on adaptation actions and strategies at different levels and scales (FOLKE et al., 2007). SMIT et al. (2000) distinguish variability based on three temporal dimensions; i) variability reflected in long-term trends in mean values related climate "norms", ii) variability about norms over periods ranging from a few years to several decades, and iii) isolated extreme events or catastrophic weather conditions such as floods, droughts or storms (p. 231). The first temporal variability refers mostly to climate change and global warming, whereas the second and the third type of variability consider shorter time-spans, from several years to daily changes. Although, at first, one may rightfully argue that these variabilities are not independent of one another (extreme events are part of variability, which is itself an inherent feature of climate), it is important to distinguish between them, because adaptations may be different when viewed as a response to an isolated extreme event as compared to a recurring condition (SMIT et al., 2000).

In this study, the annual variability is illustrated with the changes in water flow entering one of the HPP located on Drin River, namely Vau i Dejës HPP. The

[48] Some reports point to a total of 3600 m^3/sec flowing in Buna River, out of which, 3000 m^3/sec have been carried by Drin River (2400 m3/sec from have been discharged from Vau i Dejës HPP and 600 m^3/sec from Drin itself) and 600 m^3/sec have been discharged from Lake Shkodra (KALAJA, 2011). Whereas, informal sources point to around 6000-7000 m^3/sec discharged into Buna River.

Vau i Dejës HPP was taken as reference for the fact that it is the last HPP in the cascade, from where excessive water flows accumulated in the three reservoirs are discharged downstream. While it would have been better to have data about water flows from all HPPs, the water variability at Vau i Dejës HPP provides a reasonable illustration since all the HPPs are strongly connected to one another. If water levels flowing into Fierza HPP (the upper one in the Drin cascade) are low, also the discharge into the lower-positioned HPPs will be low, because it will tend to accumulate and utilise it for energy production. When there is a high water flow in the upper reservoirs, the amount of waters discharged to other HPPs will be higher as it may be risky to accumulate above a determined level. All excessive waters will be discharged via Vau i Dejës HPP into Drin River and then Buna River (pers. comm. with Vau i Dejës HPP specialist). That implies that the energy sector may itself need to adapt its operations and activities to the recurring water variabilities. However, the efforts for adaptation from the energy sector may be restricted by other goals such as flood control for downstream local communities (LEHNER et al., 2005).

Figure 5-2: Historical trends f water flow into Vau i Dejes HPP



Source: Data are from HPP Vau i Dejës.

Note: Data from 1984-1998 are missing.

Local communities, on the other hand, may not have all the necessary information (i.e. average changes in water flows, precipitation, or temperatures across years), especially in developing countries, to anticipate and respond to climate-related variability. Their adaptation strategies are mostly based on the perceptions they have about the climate variability they experienced during their daily life, and which are different among farmers and localities (ELMQVIST & OLSSON, 2007).

Also, the study areas, farmers perceive changes in water availability in different ways. For example, as shown in Table 5-15, about 85 % of the respondents in Shkodra perceive that there has been more water in recent years, as compared to 66 % of respondents in Lushnja region. Meanwhile, about 30 % of respondents in Lushnja perceived reduced water availability in recent years as compared to about 10 % of respondents in Shkodra.

Table 5-15: Perception of current changes in water availability

Perception of changes in water availability	Shkodra	Lushnja
More	85.14	66.23
The same	4.05	5.19
Less	9.46	27.27
I don't know	1.35	1.30
Total	100.00	100.00

Source: Own calculation.

Note: Two respondents answered "I don't know"; Values are in percentage.
Kruskal-Wallis H-Test for perception over degree of changes in water availability by region with 1 d.f; chi-square = 5.412 and p=0.0200; chi-squared with ties = 9.609 and p = 0.0019 at 10 % significance level.

When considering the perceptions over the future water availability, the picture is turned upside down. Table 5-16 indicates that about 82 % of respondents in Shkodra perceive that there will be less water in the future. Most of the respondents attribute this perception to the current state of irrigation and drainage infrastructure (see Section 5.1.2) and even to expected climate changes. One of the interviewed farmers illustrated his remark on climate change as a cause for future reduction on water availability with a concrete observation: *"Look, it is the end of October and it is still about 20 degrees. Some 20 years back, we would be wearing coats and going around with rubber boots"*.

Table 5-16: Perception over future water availability

Perception of future water availability	Shkodra	Lushnja
More	2.70	7.79
The same	14.86	27.27
Less	81.08	59.74
I don't know	1.35	5.19
Total	100.00	100.00

Source: Own calculation.

Note: Two respondents answered "I don't know"; Values are in percentage.
Kruskal-Wallis H-Test for perception over degree of changes in water availability by region with 1 d.f; chi-square = 2.369 and p=0.1238; chi-squared with ties = 3.676 and p = 0.0552 at 10 % significance level.

Therefore, adaptation strategies and measures would differ across farmers and localities. Also, the cross-scale adaptations may be different depending on the temporal variability. For instance, while the energy sector may mostly need to take into account the first two annual variabilities (climate change and annual variability) because the impacts from isolated extreme events can be dampened by storage abilities and regulatory processes of HPP operations, local communities and actors from other sectors (agriculture and flood protection authorities) may need to employ a broader range of adaptation strategies and activities that account for the three types of temporal variabilities.

However, before exploring and discussing the adaptation strategies and activities that are undertaken in the study area, it is necessary to point out and highlight the relevance of these strategies for the resilience of the respective social-ecological system.

In the theory part (Section 3.4.1), I discussed several concepts that are related to the resilience of social-ecological systems such as states, state variables, basin of attraction, stability landscape, regimes and thresholds. As explained there, the state of a system has been described "as the collection of values of the state variables at that particular instant in time; the state variables consist of the elements that define the state space; a "basin of attraction" is a region in state space in which the system tends to remain, and if there is only one basin of attraction then the set of states in the basin is equal to the set of states in the system's state space. The boundary between two basins of attraction is known as a threshold, whereas the various basins that a system may occupy, and the boundaries that separate them, are known as a "stability landscape".

The case under investigation is of a stability landscape with two basins of attracttion. One basin of attraction is the agricultural system which currently is the dominant basin of attraction and the other one is the marshland which used to be the dominant one before the reclamation works undertaken by the communist government in the 1960s and 1970s, but still occupies some marginal areas in the overall stability landscape.

The question therefore is which kind of stability landscape is desirable for our case? The existing one with agricultural system the dominant basin of attraction or the previous one dominated by marshlands?

This is a normative question and not easy to answer since it depends on the view and interests of various actors. But taking into account the different policies enacted by the government and investments undertaken through years at the various scales, a logical assumption would be that the existing stability landscape with agricultural system the dominant basin of attraction would be the desirable state.

After having identified the relevant desirable state for the case at hand, the analysis will proceed with exploring and discussing the adaptation strategies and activities undertaken by the local community and higher level governance structures to enhance the resilience of this stability landscape under climate variability and increased uncertainties.

In terms of short-time variability (that could take days or weeks) derived from extreme events such as floods, farmers may need to anticipate them at the individual level or community level. At the individual level farmers may anticipate floods by relying on their traditional measures such as constructing houses and other farm facilities high above ground, or even procure boats to be used for transporting people and livestock to safer places when emergencies occur. At the community level, they may need to organise themselves by pooling resources together to be used when needed. These kind of traditional adaptive measures have been found in many flood-prone areas in developing countries. FEW (2003), for example, quotes a range of traditional risk reduction measures from tying ropes across fast-flowing rivers with bells attached to warn when flash floods flow down the valleys in Pakistan, to construction of houses on plinths, livelihood diversification and the mobilization of community-based support networks to provide shelter and food in Malaysia.

At the higher levels, the most common adaptation measures relate to enforcement of embankments and dams, and maintenance of the drainage infrastructure. These kinds of measures are referred to as "structural" interventions and generally involve engineering works. Most of these works are generally carried out by government agencies or other specialised entities (PARKER, 2007).

In terms of longer-time variability that exhibit recurring patterns (climate change or variability in annual norms), farmers employ a more responsive approach by adapting their farm practices to the emerging conditions. Some common adaptation measures involve altering the cropping structures (BRADSHAW et al., 2004), income and farm diversification (KELLY & ADGER, 2000; OSBAHR et al., 2010), and use of improved crop varieties, improvement of technologies for water management or improve the effectiveness of pest/disease management (HOWDEN et al., 2007; SUTTON et al., 2013).

It has to be noted, though, that the adoption of a certain adaptation strategy, it is argued, may also be influenced by other non-climate-related risks such as shifts in product prices, changes in government-support programmes, or the limited capacities of farmers to identify adaptation that are suitable for responding to emerging opportunities (BRADSHAW et al., 2004). Although these and other non-climate-related factors are found relevant in several case studies and modelling exercises, scholarship focusing on adaptations to climate-related risks suggests undertaking of empirical assessments of actual adaptive behaviour in particular places over particular periods of time, which can help to identify the different factors that affect farmers' adaptation strategies (BRADSHAW et al., 2004; SMITHERS & SMIT, 1997).

Therefore, also this study relies on contextual empirical inputs to understand the current adaptation strategies undertaken by farmers when facing floods and how they affect the resilience of the social-ecological system.

5.3.3 Adaptation strategies to floods in the study area

Local communities (farmers) respond to climate-related impacts based on sets of options available by, among other activities, prioritizing their production and consumption patterns (OSBAHR et al., 2010), as well as relying on their social capital (PELLING & HIGH, 2005). These adaptation actions derive from their ability to deal with complex adaptive systems learned through their practices and experiences (SCHEFFER, WESTLEY, & BROCK, 2003). As discussed above and in Chapter 3 (Section 3.4.2), adaptations can be autonomous and planned, as well as anticipatory and responsive. They also cover temporal dimensions such as short-, medium- and long-term, and can be carried out by farmers (individually or collectively) and/or by government agencies.

These actions and strategies – anticipatory and/or responsive, or planned and/or autonomous – taken at the various levels need to consider the natural (ecological) systems and human (social) systems[49] in a coupled way, given their mutual interconnectedness (NELSON et al., 2007).

The main adaptation strategies that farmers have adopted in the study area and the changes in the physical (hydrological) characteristics of the water resources described above are presented in a schematized form inTable 5-17. Each of these adaptation strategies and actions will be subsequently analysed in the proceeding sections. Section 5.2.3.1 will focus on responsive adaptation strategies by explaining the changes in the agricultural practices and other income diversification strategies employed by farmers in the study area. More specifically, it will show how crop structures have changed from the time of the collapse of the communist regime and nowadays. The changes are explained in terms of surface area planted with major crops such as wheat, maize, alfalfa, vegetables, fruit trees (including vineyards) and decorative trees. The income diversification strategies relate to incomes generated by off-farm opportunities and remittances.

[49] The terms human system/social system and natural system/ecological system mean the same thing in this case and are used interchangeably.

Table 5-17: Adaptation strategies in Shkodra study area

		Anticipatory	Responsive
Natural Systems			- Changes in the physical characteristics (hydrology) of the water resources in the study area (Section 5.2.1)
Human Systems	**Autonomous**	- Construction of houses high above ground (Section 5.2.3.2)	- Crop diversification (avoid planting winter crops, especially wheat). - Income diversification (from migration and off-farm work) (Section 5.2.3.1)
	Planned	- Create a common emergency fund with fodder, food and financial resources - Set up a first aid team with educated youngsters from the village and provide trai ning (Section 5.2.3.4)	- Enforcement of river banks - Canal cleaning (Section 5.2.3.3)

Source: Own elaboration adapted from SMIT & PILIFOSOVA (2001).

Although, as discussed above, these adaptation strategies are not the only ones available to farmers, they are considered to be relevant for Albania for a number of reasons. First, the Albanian agricultural sector is still largely semi-subsistence oriented. That means that farmers plant mostly traditional crops, such as wheat, maize, alfalfa and vegetables that are necessary for fulfilling the needs of the household, and some additional income sources may be required to complement the household's economy. Second, the farm structure is characterised by high land fragmentation, which enables a diverse crop structure. And third, government-support programmes such as insurance programmes, access to credit or other extension services to provide farmers with information related to adaptation measures in response to climate change are sparse (WORLD BANK, 2011). Therefore, most of the farm-level adaptive strategies that farmers undertake generally derive from their experience (ADGER, 2003).

Section 5.2.3.2 will explain other individual level adaptation strategies taken by farmers to anticipate adverse impacts from potential floods such as construction of houses and other farm facilities high above ground. This form of adaptation would reveal the historical occurrence of adverse events in a particular area and it is informative for understanding the experiential learning dimension of adaptation, which is an important ingredient for the resilience of social-ecological systems, together with flexibility and self-organisation (BERKES et al., 2003).

Collective level anticipatory but planned strategies are discussed in Section 5.2.3.4. Here, the focus will be put on self-organisation mechanisms employed by the community, highlighting especially the positive role that trustworthy leadership play in bringing the community together.

The planned responsive strategies undertaken by government agencies are, on the other hand, discussed in Section 5.2.3.3. They primarily include enforcement of river banks and cleaning of primary drainage canals. Although there are a range of planned responsive strategies available to government agencies, the problems of floods in Albania are generally related to functioning of drainage infrastructure. Several reports on possible impacts of climate change in Albania view functioning and modernisation of drainage infrastructure as a key adaptation measure especially for the sustainability of agricultural sector (MEFWA, 2009; SUTTON et al., 2013).

5.3.3.1 Crop and income diversification

Agriculture is one of the main contributors to the livelihoods of the community (COMMUNE OF DAJÇ, 2008). The communities in the study area continuously adapted their agricultural practices and livelihoods not only to changing climate conditions, but also to the changing socio-economic and political setting. Until 1991, all agricultural activities were exclusively managed by central authorities of the communist regime, who decided where and what to plant (DE WAAL, 2004). After the breakdown of the communist regime, which led to the collapse of agricultural cooperatives, agricultural activities were independently carried out by individual farmers. They decided what, how much and where to plant. According to the agronomist of Dajç commune, bread cereals – especially wheat – were the main crops planted by farmers with the intention to at least guarantee their subsistence. The land surface planted with wheat started to gradually decline, taken over by summer crops such as fodder for the livestock and vegetables. Although the data for the years 1996 to 2009 is missing and cannot reveal the full picture of the changes in crop structure over the missing years, it can however point out the different changes that have occurred with the land surface planted with most traditional crops. The most significant change pertains to the land area planted with wheat. As shown in Figure 5-3, the land surface planted with wheat went down from about 20 % of the total surface or 550 ha that were planted in 1994 to about 1 % or only 6 ha in 2011. In 2010, the area planted with wheat amounted to about 8 % or 80 ha, whereas in 2012, it amounted to about 3 % or 24 ha of the total land, experiencing a slight increase as compared to the year 2011. It has to be noted that the total land surface of the commune for all the years is constant (2,683 ha).

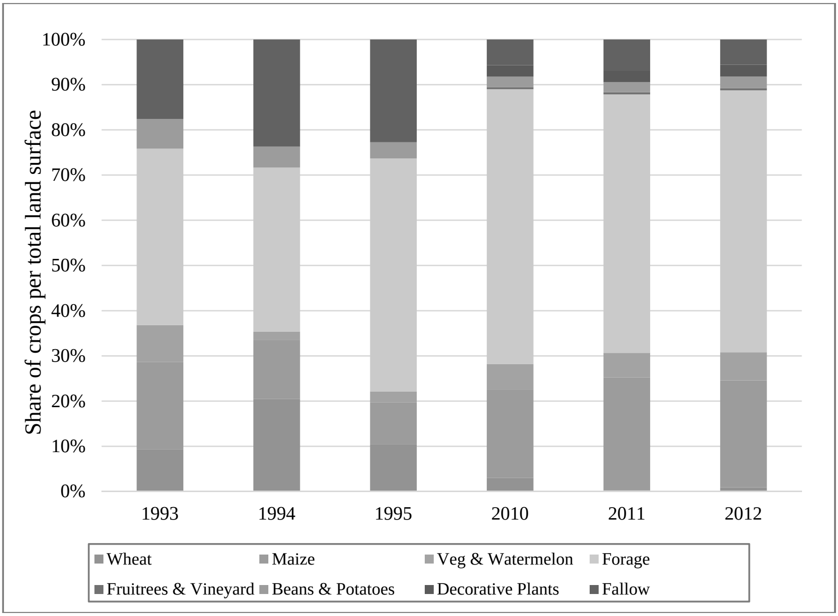
The share of agricultural land with vegetables and watermelons has generally remained constant, at about 5 % of the total land, with some slight fluctuations across the years, whereas land surface planted with beans and potatoes shows a small decline as compared to early 1990s.

Other major crops such as maize and forages (alfalfa) have also experienced changes in terms of the planted land surface, although not so drastic as the one with wheat. From about 20 % or 520 ha that occupied in 1993, it went down to about 10 % or 250 ha in 1995. In the recent years, it has increased again, occupying about 20 % or 527 ha in 2010, and about 25 % or 670 ha in 2011 and 637 ha in 2012, respectively.

The share of agricultural land with vegetables and watermelons has generally remained constant, at about 5 % of the total land, with some slight fluctuations across the years, whereas land surface planted with beans and potatoes shows a small decline as compared to early 1990s. Meanwhile, fruit-trees, vineyards and decorative trees appear to have been introduced after 1995, although their share is relatively small in relation to the total surface.

The most surprising development in crop structure pertains to changes in surface of fallow land. From about 17 % or 472 ha in 1993, it has gone down to about 5 % or 150 ha in 2012. Considering the recent floods in the area, one would logically expect a reverse trend with respect to the land surface left fallow. However, farmers and key experts explain that lands that were previously left fallow are now planted with alfalfa or mostly used as a grazing land for the livestock, as it will be shown inFigure 5-3 below.

Figure 5-3: Crop structure in Dajç Commune



Source: Own calculation (data have been provided by Shkodra Regional Agricultural Office).

Note: The figures are for the entire Dajç Commune.

Thus, the point is to distinguish and understand whether the reasons for the changes in crop structures and other diversification strategies can be attributed solely to climate variability, or also to other factors. For example, ADGER (1999) argues that in all rural communities, climate is only one of the many factors that influence rural communities' adaptation and coping strategies to environmental changes and these factors may be related to market dynamics, subsidies, inputs, labour supply, migration etc.

Below, I will describe the main households' diversification strategies in terms of farm practices and income sources and highlight and discuss the main reasons that have influenced farmers' strategies.

In Albania, the livestock sector has become an important component of the agricultural economy. After privatization of agriculture in the early 1990s, livestock increased by 90 % due to growing demand for livestock products and low capital requirements (WORLD BANK, 2011). This increase in the importance of livestock was consequently associated with an increase in the land surface planted with forage crops, mainly alfalfa. As shown in Figure 5-3 above, the same situation was witnessed also in Dajç area. According to the Mayor, there are about 4500 heads of cows in the community, approximately 2 cows per family. Similar figures are reported also in our household data, which indicate that about 90 % of the respondents own at least one cow, with a median value of 4.5 cows[50]. The livestock (cows) is mostly used for milk production which is collected on the spot by some 5 small dairy factories that are located in the area. These dairy factories collect everyday about 4000 litres of milk from the farmers of Dajç commune (pers. comm. with the Mayor). The fodder for the livestock is secured by the alfalfa and maize that farmers plant in their fields. In average, about 34 % of the household's land surface is planted with maize and about 32 % is planted with alfalfa (see Figure 5-3). On top of that, a considerable share of land is used as grassland, about 20 % of the total surface[51], where farmers can take their livestock on daily basis.

It has to also be noted that maize that farmers produce is not used exclusively for livestock production. Farmers explained that part of the produced maize is used for household needs, while a few of them sell part of it to individuals to be then sold as roasted corn cobs[52].

Other crop diversification strategy relates to the planting of valuable crops such as greenhouse vegetables and decorative trees. As shown in Figure 5-2, greenhouses and decorative trees were introduced after 1995. These crops are usually planted close to the homestead, and usually in small surfaces. Vegetables are sold in the regional market in Shkodra City, some 15 km away, whereas the decorative trees are generally picked up at the farm by interested costumers based on some verbal agreements.

A relevant argument may be that these changes in crop structures may be attributed to and dictated by market forces and/or other factors not related to climate ones.

That is partly true! But when looking at the changes in land surface planted with wheat, more direct climate-related factors are then found to be in play.

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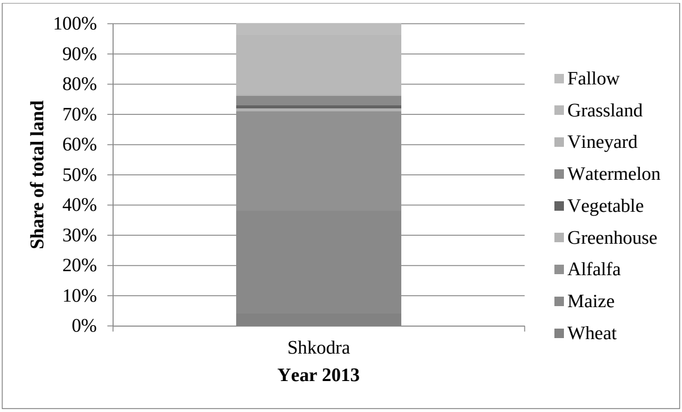
50 It is reported the median value because one farmer owns about 50 cows, a figure which would distort the average value of number of cows per farm.

51 Note that the total land here refers to sum of the farm size of each household interviewed in the three villages of our study area.

52 Roasted corn cobs are particularly sold in beach areas where holidaymakers consume it as a recreation. They are generally roasted on little portable charcoal grills.

Figure 5-4: Crop structure based on household data

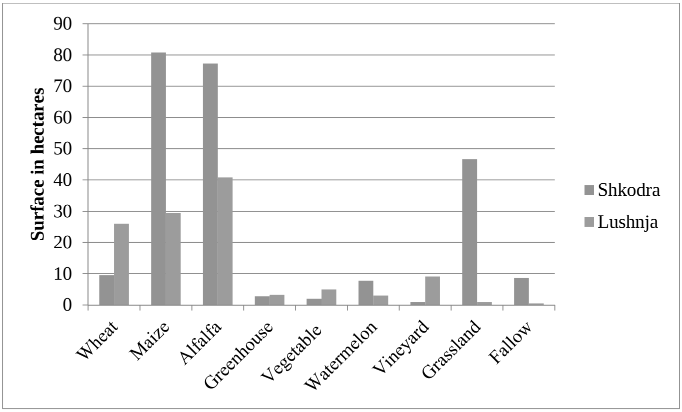


Source: Household data from field survey 2013; N=38.

For instance, it is true that the country-wide land surface planted with wheat has reduced from 112.000 ha in the year 2000 to 69.200 ha in 2011 (MAFCP, 2012) and that may be attributed to market dynamics. Nevertheless, when looking at the data from the field survey in both study areas (Shkodra and Lushnja), we see, as shown in Figure 5-4, that the surface of land planted with wheat for the year 2012-2013 in Lushnja is about three times larger than in Shkodra, with 26 ha in Lushnja and 9.5 ha in Shkodra. This difference in wheat surface cannot be explained solely by market dynamics or structural processes for two simple reasons. First, the structural processes and wheat price in both regions are almost similar, and second, the wheat price over the years has increased, from 33 Lek/kg in 2000 to 49 Lek/kg in 2011 (MAFCP, 2012).

A logical explanation for this difference is the occurrence of floods in Shkodra region. This is illustrated by the responses of farmers in the study area. One of the interviewed farmers explained his decision not to plant wheat by pointing out: "*I have not planted wheat for a long time because of the water. Also, the vegetables are planted in gardens that are located next to the road whose elevation is higher than the arable land*". Another farmer goes in the same direction stating that "*I have historically planted maize and alfalfa…. I have not planted wheat because I fear there will be flooding*".

Figure 5-5: Crop structure in Shkodra and Lushnja 2013



Source: Own calculation (data collected during field survey in 2013).

The decision to avoid planting wheat can be considered an autonomous responsive adaptation strategy to floods (see Table 5-17). Theory suggests that autonomous adaptations are undertaken by individuals or private actors and are generally performed unlinked to actions taken at higher level of governance (see Section 3.4.2). In our case, there has been no real involvement from government authorities in providing, for instance, insurance instruments to losses due to floods. Although the government pledged to compensate all farmers affected by floods for the losses in agricultural produce and livestock as well as for the damages to farm equipment and other household assets, farmers in the study area complained that many of them have not yet received the promised compensations. Moreover, they also expressed reserves related to the assessment of damages, which according to some of the interviewed farmers, was far below the value of the real losses and damages. As a consequence, the farmers' household economy was hardly hit, impacting on their long-term adaptive capacities and possibly enhancing their vulnerability to future adverse events.

Additionally to crop diversification, farmers in the study area have adopted also income diversification strategies. The most common strategies are off-farm work and migration abroad. The data collected during the fieldwork in summer of 2013 reveal that about 22 % of the respondents supplement their household budget with incomes from off-farm work. Off-farm activities usually consist of employment in public administration either in the commune, or other local government agencies in the city of Shkodra, as well as in the private sector, where the activities consist mainly in running small businesses such shops/coffee bars, or work in construction in Shkodra city and surrounding areas.

Migration, on the other hand, relates mostly to international migration and is directed especially towards Italy and Greece (see also KING, 2003; MILUKA et al., 2010). For migration, our data show that 17 % of respondents supplement their incomes with remittances from abroad. The amount of contribution to the household budget of the respondents that stated to have received remittances is in average about 49 %, and goes up to 80 % in one case. These figures are, however, relatively higher than the national average of 13 % (CARLETTO et al., 2004). That can be explained by the fact that many of these households are of relatively old age and are not involved much in agriculture. Therefore, their livelihoods depend mostly on remittances and the little pensions they get from the state. The role of migration for farm diversification strategies is found to have mixed implications since it has, in one hand, a negative correlation with labour availability for agriculture, but, on the other hand, it has an overall positive impact on improving the economic situation of rural families (MILUKA et al., 2010).

The question then is what does this mean for adaptation strategies to climate-related risks and resilience of the community?

As discussed above, many of the adaptation strategies that farmers undertake are not directly linked to climate or environmental change. But they do however contribute indirectly to households' adaptation efforts to climate change, by reducing their social vulnerability[53]. ADGER (1999) argues that the diversity and variability of income sources over time can be used as an indicator of vulnerability at the household level and hypothesises that the greater the diversity of incomes the greater the resilience of the households' livelihoods.

Other personal traits such as experience and local knowledge play also an important role on farmers' adaptation efforts (FEW, 2003). As it will be shown in the subsequent section (Section 5.2.3.2), additionally to responsive strategies, farmers undertake also anticipatory strategies, by building houses and other farm properties high above ground to avoid losses and damages to valuable assets.

5.3.3.2 Construction of houses high above ground

Another important adaptation strategy undertaken by the villagers in the study area is the construction of household facilities such as houses, barns and drinking water pumps high above ground (for an illustration, see Figure 5-6 and Figure 5-7). These actions fall into the anticipatory adaptation strategies that farmers have adopted in response to floods, and are tailored to their past experiences. As described in sub-section 5.2.1, the study area has a rich history of floods of different sizes, but the recent ones appear to have reached unprecedented

[53] ADGER (1999) distinguishes social vulnerability into individual vulnerability and collective vulnerability. Individual vulnerability is determined by access to resources, the diversity of income sources and the status of the household in the community. Collective vulnerability is determined by institutional and market structures such as prevalence of informal and formal social security and insurance, and by infrastructure and incomes (p. 252).

levels and caught the local communities by surprise. The priest of Dajç describes the community's experience with the floods like this:

> *"The last two years have been characterised by floods. We conducted a They told us that there historically used to be large amounts of water, small survey asking elderly people about the history of floods… but not to these levels… during the recent floods, waters were so high that farmers were "tying" their boats to their windows…".*

The decision to construct houses and other farm assets high above ground is an autonomous anticipatory strategy, as represented in Figure 5-6 and Figure 5-7.

Figure 5-6: House and water pump

Figure 5-7: Barn for grains and livestock stable

Photo: Author (November, 2011).

It is anticipatory, because it aims to anticipate potential floods that may occur in the future. The stimuli for undertaking such a strategy come from farmers' long experience with and historical occurrence of floods. As a farmer explains, *"apart from the last two years during which the amount of water was too high, we are normally used to have water here. When the water level is below 170 m, I consider this normal! I have raised the house, water pump for drinking water up to 170 m high, keeping in mind that there is a high risk of high water".*

On the other hand, it is autonomous because, similar to crop and income diversification strategies, the involvement of government agencies is very scarce. Even the important analytical and strategic documents produced by the government and donor agencies do not list strategic construction of houses and farm facilities in any of the adaptation measures, be it short-, mid-, or long-term (see MEFWA, 2009; SUTTON et al., 2013).

Most of adaptation measures and strategies undertaken by government agencies, as it will be discussed in Section 5.2.3.3 below, are planned and mostly directed to more structural (engineering) interventions such as enforcement of river banks, canal cleaning and deepening and other maintenance of major hydraulic infrastructure. Adaptation measures targeting information-related instruments such early warning systems or weather forecasts are not yet in place, although they figure in key documents focusing on national-level adaptation strategies (see MEFWA, 2009).

In the lack of early warning systems against floods (which could happen at night for example), farmers rely on the available assets they have, such as boats, to quickly respond to unexpected floods. According to one of the farmers, many households used to have boats even during communism. Today, for many of them, owning a boat, as illustrated in Figure 5-8, has become a necessity since it serves as one of the first responsive actions undertaken to deal with floods.

However, although farmers consider the possession of boats as a responsive instrument against floods, it is necessary to highlight that boats are used also for other activities, especially fishing. Living in close proximity to Buna River, fishing, as an economic activity, is performed by many households, but its share to households' economy is still rather small as compared to crop and livestock production (COMMUNE OF DAJÇ, 2008).

Figure 5-8: Private boat

Photo: Author (November, 2011).

Therefore, possession of boats cannot be considered a typical adaptation strategy or measure against climate risks, but, just like the other farm diversification activities discussed above, it can indirectly contribute to enhancing households' resilience by increasing the range of adaptation and responsive measures available to farmers.

5.3.3.3 Enforcement of river banks and canal cleaning

Adaptation strategies undertaken by farmers alone may not be sufficient to deal with floods and future uncertainty. This is especially relevant when considering the physical conditions of the flood protection infrastructure and drainage network. As noted in previous chapters, maintenance of primary irrigation canals, primary and secondary drainage canals and other drainage infrastructure facilities such as dams, pumping stations (hidrovoret) and embankments is a responsibility of Drainage Boards. Maintenance and desilting of drainage canals should be periodically performed. However, key informants and various sources indicate that these works have not been properly carried out for several years[54]. Table 5-18 shows the expenditures of the Albanian government on irrigation, drainage and flood protection facilities. As it can be noticed, the level of total expenditures prior to floods was at a range between 360 million ALL and 600 million ALL (about 2.5 million Euros and about 4.5 million Euros, respectively).

Table 5-18: Expenditures by government on irrigation, drainage and flood protection infrastructure

Expend.	2007	2008	2009	2010	2011	2012	2013	2014
Irrigation facilities	0	304,226	224,085	143,535	377,320	495,712	150,650	97,500
Drainage facilities	295,187	46,700	125,305	113,298	50,288	100,367	75,111	179,700
Flood protect-tion facilities	280,071	0	257,193	192,269	1,279,007	469,238	84,550	20,374
Total Expend.	575,258	350,926	606,583	449,102	1,706,615	1,065,317	310,311	297,574

Source: MINISTRY OF AGRICULTURE, RURAL DEVELOPMENT AND WATER ADMINISTRATION (2015).

Note: Figures are in thousand ALL.

54 See also WORLD BANK (2003: 8-9).

The expenditures across the different sectors (irrigation, drainage, and flood protection) were relatively equal in terms of their share to the total amount, with notable exceptions in 2007 for irrigation infrastructure and in 2008 for flood protection facilities, during which no expenditures were made for the respective sectors.

Meanwhile, after the flooding of late 2010, the level of total expenditures, particularly on flood protection facilities, increased by about 10 times as compared to the previous years, falling again to the previous levels during the subsequent years.

What these figures imply is that the existing maintenance activities financed by the government and the infrastructure in place could not deal with the massive volumes of water flowing in rivers and into canals. Consequently, that required larger investments to clean, reinforce, modify and repair the existing flood protection structures.

Drawing from the theory on types of adaptation activities (Section 3.4.2), the investments in flood protection infrastructure (enforcement of river banks, canal cleaning, and reparation of pumping stations) fall into the category of planned responsive adaptation activities. Different from autonomous strategies which are generally taken by individuals or private actors based on their available range of options, planned adaptation strategies are based on a deliberate decision making process, rely on more detailed (usually scientific) information (especially for engineering works), and are taken by government agencies or other structured organisations (SMIT & PILIFOSOVA, 2001).

Although the government has pledged considerable amounts of financial resources especially in 2011, these adaptations activities are nevertheless far from complete. As illustrated in Figure 5-9, only one side the river bank in Dajç area is protected by embankments. Reinforcement of only one side of the embankment has enhanced the protection of Dajç area, but has further exposed to floods the already-vulnerable Obot village that is located at the opposite side of Buna River. According to experts from Shkodra Drainage Board and from farmers of Obot village, with the reinforcement of the embankment on Dajç side, the excessive waters that will be contained by the reinforced embankment will now be spilled over in larger quantities to the village and the fields of Obot.

Figure 5-9: Enforced embankment and the opposite side

Photo: Author (November, 2011).

As explained by a specialist from Shkodra DB, the fields and the village of Obot are among the first one to get flooded when the waters of Buna River reach high levels. Given the susceptibility of these areas to floods, a large part of the village had been resettled during communism. After a destructive earthquake that hit Shkodra region in 1979, many houses and buildings were destroyed across the region, including Obot village. The communist government took up the opportunity and resettled the households whose houses got damaged. With the fall of communist regime, many of these households returned to their lands, building new houses or reconstructing the existing ones.

One could logically raise the question why the investments are performed only at one side of the embankment and not at both sides. The explanation for this issue however depends on whom you address the question. On the one hand, farmers from Obot village attribute this development to power relations and political networks that are in place in the region. They consider the local administration of Dajç Commune as more influential and better connected to higher political circles in the region and at the central level, which enables them to absorb more investments than Obot village. Note that Obot village is part of another administrative unit, namely Ana e Malit Commune, and it is the only village that is susceptible to floods because the other villages of this commune are located in hilly terrain.

On the other hand, representatives from government agencies attribute this decision to lack of sufficient financial resources from the government to cover the entire length and both sides of the embankment.

Which of these explanations is closer to the reality is difficult to discern since it was not possible to acquire first-hand information concerning the motives at the central government to invest only in part of the embankment, as well as trace the political networks and power relations of local administrators.

However, when referring to Table 5-18, we can notice that the total expenditures for irrigation, drainage and flood protection infrastructure have been sharply cut during the years 2013 and 2014. The key implication from these figures, regardless of the reasons, is that the planned adaptation activities are not performed in a regular basis and may negatively impact on the resilience of the social and ecological system. The negative impact on the resilience of SES refers to potential changes in the stability landscape that were discussed earlier.

In this regard, the need for continuous maintenance of river embankments is related to the soil characteristics of the areas surrounding Dajç commune. These areas used to be marshlands that were drained during communist period to be turned into agricultural lands. If these fields are not drained and protected accordingly, first, the run-off waters spill over the fields of Dajç and other areas of Shkodra plain, and second, there is a risk that they can become marshland again if they remain under water for long periods of time.

Thus, these areas are protected by embankment and drained by the pumping stations (hidrovoret) of Velipoja and Ças. Due to the marshy characteristics of the soil with high propensity of sinking, the embankment requires continuous maintenance. However, as explained by the Shkodra DB specialist, considering the DB's financial limitations, it is unlikely that the required maintenance works will be performed on a yearly-basis.

Other planned and responsive measures undertaken by government agencies concerning adaptations to floods are related to the functioning of pumping stations (hidrovoret) and major canals that drain the Shkodra plain. After the fall of the communist regime, alike other infrastructural assets of agricultural cooperatives and state enterprises, pumping stations fell also into disrepair. Pumps were outdated and needed continuous maintenance, and in many cases needed complete replacement. Additionally, power-cuts – a common winter phenomenon in Albania – ampered their normal operation increasing in this way the risk of flooding, especially in highly flood-prone areas. The occurrence and increased risk of flooding was further aided by the reduced collecting capacity of drainage canals, due to lack of continuous maintenance. As illustrated in Figure 5-10, these canals are covered by vegetation and often are turned into waste dumping grounds. Despite many investments in embankment reinforcement and canal desilting, the risk of flooding may be minimized by undertaking additional adaptation strategies. One of the frequently emphasized strategies by key informants and other secondary sources is the digging of Buna riverbed and the widening of Viluni Canal – the major drainage canal of the area – which would significantly increase the water discharge into the Adriatic Sea.

As explained by Shkodra DB specialist, a new, to-be-implemented project on integrated water resource management financed by the World Bank has foreseen widening of the Viluni Canal. This canal would serve as a second outlet for discharging the excessive waters into the Adriatic Sea during winter time. The DB specialist further explained that the widening of the canal – foreseen three times the current size – would discharge up to 2000 m^3/second. The actions and strategies undertaken by the government may have substantially enhanced the protection of these communities to flooding. Yet, for reducing their long-term vulnerability, these responsive measures need to be transformed into anticipatory strategies, which, on the other hand, may require sufficient resources and continuous investments. As noted by the DB specialist, Shkodra DB operates two excavators for the entire Shkodra area, but for which not even sufficient fuel has been allocated to operate them the whole year.

Figure 5-10: Secondary drainage canals

Photo: Author (November, 2011).

According to him, the rationing of the fuel has led to difficulties related to cleaning and maintaining the entire primary drainage network. Additionally, the embankment needs also constant maintenance, because due to low water levels in the river during summer time, the lower part of the embankment risks to be eroded and if not properly maintained, it may break after some years.

5.3.3.4 Self-organization of local community

The enforcement of river banks and cleaning of primary drainage canals have evolved as a responsive planned strategy undertaken by the government agencies. These actions certainly contribute to the reduction of risks to floods, but for the communities to be resilient in the long run, some form of self-organization needs to be in place (OSTROM, 2009). As discussed in the theoretical background (Chapter 3), the ability of communities to self-organise depends on their social infrastructure that consists of social capital and more formalized forms of organizations that could be local government, religious institutions or farmers' associations. And, social capital consists mainly of the social fabric (norms, customs) that develops trust and reciprocity, and social networks that are created through interactions with various actors at and across multiple levels of society (ADGER, 2003; AHN & OSTROM, 2008; COLEMAN, 1990; EGGERTSSON, 1990; PELLING & HIGH, 2005).

Leadership – denoted as (U5) in Tier II of Ostrom's framework – is considered a crucial component for community self-organization and sustainable management of SES, given that leaders act as catalyst encouraging collective action and fostering public participation in resource management (FOLKE et al., 2005). Involvement of local communities in collective action has been problematic across post-communist countries, including Albania (BARR, PACKARD, & SERRA, 2014; KVARTIUK, 2015; SCHMIDT & THEESFELD, 2012; THEESFELD, 2004).

In our case study, problems of local organization have, however, been overcome by the involvement of and initiatives taken by the local church. During the recent floods, the church[55] became the focal point of all emergency activities. These activities included both forms of adaptations – anticipatory and responsive[56]. The early anticipatory measures were generally targeted to strengthening the emergency response and organizational capacity of the community when facing with flooding. As explained by the priest of the local church, Dom M., these measures included:

- the carrying out of an analysis of the zone to identify the most exposed areas and more vulnerable families and individuals, in order to prioritize the intervention;
- awareness-raising in schools (high schools) with youngsters on what they should do in cases of emergencies;
- establishment of a first aid squad to have a more qualified and coordinated intervention.

These measures were followed up by more concrete responsive actions to the occurring flooding emergency and anticipatory strategies to deal with future floods. The responsive measures included:

- monitoring of embankment and helping in people's evacuation. With water level increasing fast, the embankment was at risk of breaking. Dom M., together with some youngster from the parish went home to home to raise the awareness of the people to contribute for the protection of the embankment. As noted by him, the embankment has been monitored

[55] Albania has three dominant religions, Muslim, Roman Catholic and Christian Orthodox. According to the 2011 census, Muslims make up the majority of the Albanian population with 58.79 %, followed by the Roman Catholics with 10.03 % and Orthodox Christians with 6.75 %. Muslim population is mostly concentrated in Central Albania, Roman Catholics in Northern Albania and Orthodox Christians in the Southern part of Albania. In our study area, the dominant religion is Roman Catholic.

[56] Distinguishing between anticipatory and responsive actions in a clear-cut way may be confusing for our case. Many actions that have been taken after the first flood may be considered responsive to the first flood but also anticipatory to the second flood.

round-the-clock by the community, as the army and the police were not as effective.

The situation in the flooded areas had attracted the attention from across the country. In the city of Shkodra, many businesses and citizens solidarized with the flooded communities by providing aid and contributions in food and drinks.

During the second flood, the evacuation was necessary, as the water level was very high and the embankment broke in two places. According to key informants, the amount of water leaked from the two cracks reached about 600 m^3/sec. To contain the waters and reinforce the embankment, around 300 people were mobilized and materials worth around 3000-4000 Euros were needed. After continuous efforts, only one of the cracks was managed to be tapped.

The evacuation operations were mostly carried out by the army and other emergency units deployed by the government, but with the help of the locals. People were taken from their homes and transported next to the embankment, and then the police and the army took them to safer places. As explained by local people, parts of the embankment were turned into evacuation points because the police and the army did not know the site very well. Since the whole area was under water, it was difficult for the emergency units to navigate through the villages.

These responsive actions are followed by more anticipatory adaptation strategies. According to Dom M., the basic strategies included; a) *setting up and training of an informal first aid team* and, b) *setting up a reserve emergency fund*.

The first aid team would be formed with educated youngsters from the village, whereas the emergency fund would comprise food, fodder and financial reserves. At the time of the fieldwork, most households had already provided their contributions, and the amount of contributions was left to their free will and financial capacities. The priest, Dom M, briefly summarized the already-collected contributions:

> *"…[T]here are 300 blankets already available, and from October until 10th of November (2011), around 11 tons of maize to be used as fodder for livestock have been stored. In addition, the current financial contributions given by community members amount to 2000 Euros. Others things are also expected to be collected. Also, some buildings have been reconstructed and adapted for storehouses to be used for emergencies".*

Although the amount of these contributions will for sure not be sufficient to sustain the whole community in case of similar floods, this aspect of collective action underlines the importance of leadership for enabling self-organization and increasing local participation in issues of common interest.

Similar involvement of local church has been also for other issues of concern for community such as paving and clearing village roads. The local government asked for contributions from the community to secure the necessary funds, which in turn would be managed by the church. As explained by one of the interviewed farmers, "*most of the community members have contributed for the rehabilitation of village roads and clearing the shrubs (ferrat), either financially or through labour*". Another farmer specified further that *"the contributing families have paid 500 Lek (about 4 Euros) to the village head for hiring a company to clear the roads of the shrubs"*. The church was involved to increase the trust among community members that the money will not be misused. For the mayor, problems of collective action are a result of the communist past, during which collective action and voluntarism were forced by the regime. Dom M shares the same opinion with the mayor with respect to the impact of the past communist legacy on present collective action and local organization.

5.4 Critical reflection on results

The combination of qualitative and quantitative research methods applied in this study proved very helpful for analysing problems of water resource management in Albania. The failure of devolution policies analysed qualitatively was reflected also in the regression results which showed no significance for contributions in terms of labour and financial means. Also, other hard-to-quantify social variables used in the regression analysis such as community trust were further elaborated by means of qualitative instruments, which provided important insights into organisational dynamics of the local community.

Despite these positive aspects, the study suffers from a number of limitations. The first limitation pertains to the small number of WUOs analysed in this study. Increasing the number of WUOs and cases in general would contribute to higher statistical robustness of the results and provide enough variation to account for differences in governance and other social and physical attributes of the communities. Considering the recent institutional changes concerning the transformation of WUAs into WUOs and the failure of many of these governance structures, identifying other operating and functioning local water user groups proved to be difficult.

The second limitation relates to the different factors considered to play a role on collective action for canal maintenance. Although the determinants analysed in this study are relevant to explain collective action problems related to maintenance of irrigation systems in Albania, and are found in many empirical studies all over the world, they do in no way exhaust all possible factors and determinants that might have an impact on collective action for sustainable management of natural resources in general and maintenance of irrigation systems in particular. AGRAWAL (2001a), for example, identified over 30 variables that may need to be taken in consideration when analysing collective action and self-organisation of local communities for common management of natural resources, because they could affect incentives, actions and outcomes in different ways. According to AGRAWAL (2001a), this large number of variables could create obstacles in conducting research in a systematic and rigorous way (p. 1665). OSTROM (2007) recognises this challenge, but argues that because social-ecological systems can be partially decomposed into smaller nested systems, not all variables can be relevant for every study (p. 15182).

The third limitation that can be identified in this study concerns the analysis of institutional changes in the frame of EU integration processes, especially with respect to Water Framework Directive. Although several aspects of water governance have been highlighted in this regard, a more detailed analysis of the specific water management and governance processes is required. For instance, this study does not analyse in detail the processes and actors involved in drawing and preparing river basin management plans, protection of water resources from pollution, or drafting of water strategies. Key documents such as national and sectoral water strategies, as well as river basin management plans for different rivers basins were still under drafting process, and thus, it would be premature to draw related conclusions.

A detailed analysis of how the integrated water resource management approach has been designed and its actual impact on the management of water resources could be a potential future research topic. Such an analysis could provide direction for investigating also adaptation strategies that might have been taken or are planned to be taken at multiple scales and different levels of governance. In this context, adaptation strategies considering particularly the agriculture-energy nexus could be explored.

Chapter 6 – Conclusions and discussion

This chapter presents some conclusions and discusses the major findings of this study. Section 6.1 presents the conclusions with respect to the first research objective that aimed at assessing the institutional changes and policy reforms enforced during the post-socialist transition period. Section 6.2 presents the conclusions and discusses the findings related to farmers' incentives for engaging in collective action for maintenance of irrigation and drainage canals and Section 6.3 provides some conclusions and discusses the findings related to community's resilience and adaptation strategies to dealing with floods. Finally, some policy recommendations are proposed in Section 6.4.

6.1 Assessment of institutional changes in Albania's water governance

The first part of the thesis focused on assessing the institutional changes in Albania's water sector that were undertaken during the post-socialist transition period. The analysis identified that the devolution and decentralisation of responsibilities for water management – the major institutional changes in water governance – came about and continue to be driven by imposed, top-down mechanisms with little regard to the local context. Although these types of policy reforms are well recognised as important instruments for achieving sustainable management of natural resources, their impact on the actual management of these resources depends on the extent of responsibilities the emerging governance structures are assigned with and their ability to exercise the transferred responsibilities and decision-making powers. Agrawal and Ostrom (2001) point out that many devolution programmes face several challenges in achieving sustainable management of natural resources due to uncertain allocation of property rights, limitations in the assignment of operational rights for authorised users to withdraw resource units and that significant operational rights continue to be held by government agencies including collective-choice rights.

The results of this study showed that in both study areas, local water user groups (WUO) in both case study areas established to take over the responsibility for the management of irrigation systems appeared to be simply a formal creation, existing only on paper. In the case of the WUO in Shkodra region, the operational-level responsibilities and decision-making powers were taken over by the local government. Whereas, in the case of the WUO in Lushnja region, although some form of operational-level involvement was taking place, there was considerable "intrusion" from government agencies in key operational and collective-choice rules.

Delineation of boundaries – one of the key operational-level rules – for both WUOs was no longer based on voluntary membership. Instead, they were imposed by constitutional-level rules adopted in the water legislation, considering member of the local water user group everyone who owned or used land within the service area. Using land ownership/use as a determinant to establish water user groups (WUOs) may have contributed to clearly define WUO boundaries, but at the same time raised challenges in the enforcement of sanctioning mechanisms whenever violations occurred. Violators cannot be easily excluded from the user group, since their membership is primarily determined by the presence of the agricultural land within the service area and not by individuals' interests and motivations.

Other operational-level activities such water allocation, fee collection, maintenance, monitoring and sanctioning were also influenced by government agencies, but to varying degrees.

For water allocation and monitoring, WUOs exhibited some autonomy in the way these activities were organised and performed. Sanctioning was rarely applied and in those cases it happened, it was performed by government authorities at the local level.

Although, in reality, most of the operational rules have often underperformed, application of collection-choice rules by the community themselves has hardly occurred. Community participation in decision-making processes has been very scarce. The only time there was a change in institutional arrangement at the community level, it was when WUAs were transformed into WUOs. And, this change did not come about from collective-choice arrangements within the water user groups, but as a result of changes in constitutional rules; that is, changes in the national legislation concerning management of irrigation and drainage systems enforced by external authorities. Moreover, the changes were not targeted to address inefficiencies in operational-level rules and to support collective-choice processes. Instead, they affected the boundary rules and the authority rules, leading to a higher involvement of government agencies (Drainage Boards and the Ministry of Agriculture, Rural Development and Water Administration) in WUO's practices.

The higher involvement of government agencies is facilitated also by limitations in and unclear property rights allocated to water user groups. Irrigation infrastructure is transferred to WUOs only in-use, and covers secondary irrigation canals and below. Primary canals and water sources (water reservoirs or pumping stations) are retained under state ownership and operated (de jure) by Drainage

Boards. Unclear property rights on and lack of authority over the entire irrigation infrastructure can have negative repercussions for collective action and consequently for sustainable management of irrigation systems. MEINZEN-DICK (2014) argues that without clear property rights and authority over the irrigation system, farmers will not engage in collective action to maintain and invest in keeping the resource in productive state.

The formality of devolution programmes in irrigation management is not an exclusive feature of Albania's institutional changes. Similar cases have been found in other empirical studies in several transition countries. In studying irrigation management in Bulgaria, THEESFELD (2008) found that what formally gives the impression of being a devolution-oriented policy reform by turning over decision power in resource management to local communities is, in fact, a further concentration of power in the irrigation sector. VELDWISCH and MOLLINGA (2013), in their analysis of WUA introduction in Uzbekistan, found that the Uzbek state used WUAs as an instrument to monitor and regulate state-ordered agricultural production. Whereas, in the Tajik and Kyrgyz case, SEHRING (2007) found that the top-down policy reform for irrigation management was not perceived as legitimate by local communities and was undermined by the existing informal rules.

The failure of these top-down institutional changes highlights Ostrom's argument that resource users need to be able to design their own rules in order to have long-lasting, robust institutions (OSTROM, 1990). Delineation of well-defined boundaries, matching of water allocation and provision rules with the local context, ability to make collective-choice arrangement, monitoring, sanctioning, presence of quick and low-cost conflict resolution mechanisms, minimal recognition of rights to organise, and organisation of governance activities in multiple nested enterprises are defined as key principles that need to be in place and to be recognised by external authorities for achieving sustainable management of natural resources. OSTROM (2000) argues that locally devised system of rules, norms and property rights that are not recognised by external authorities may collapse if their legitimacy is challenged.

However, scholars have raised questions regarding the applicability of these principles in different social context and in analysing large-size, or global commons (see ARARAL, 2014; CLEAVER, 2002). To assess the robustness of these principles, COX et al. (2010) examined 91 empirical cases that evaluated Ostrom's design principles (OSTROM, 1990) and found that these principles are supported empirically, but some theoretical consideration warrant discussion, especially concerning definition of boundaries and monitoring activities.

The devolution policy was not the only feature of Albania's institutional changes in the water sector. The current institutional framework has embraced Integrated

Water Resource Management principles; a policy driven mostly by requirements of integration processes into the European Union, namely the Water Framework Directive. Based on these requirements, water resources need to be divided and managed in river basin-scale. Although the overall formal alignment of the institutional framework to EU's Water Framework Directive has progressed quickly, the practical implementation of these principles needs time to be evaluated.

Nevertheless, some obvious limitations can already be noticed. The water governance in Albania appears highly fragmented with little convergence across the sectors. Investment decisions related to water are often made on the basis of single sector considerations. Also, the role of regional level governance structures in decision making processes pertaining to water management has been considerably reduced. River Basin Councils and River Basin Agencies have been "stripped" of the authority to take decisions over large, capital intensive investments and projects that focus on water resources.

Participation of local communities, through WUOs or other community-based organisations, in drafting management plans or other important strategic documents, is at best formal.

In this way, the "institutional designers" have missed and failed to capitalise on local knowledge and experience, which, as theory suggest, are important ingredients for institutional design processes and adaptive governance of water resources.

6.2 Determinants of collective action for canal maintenance

The second part of the analysis identified some factors that determine the likelihood of farmers to engage in collective action for maintenance of irrigation systems via financial and labour contributions in a post-socialist context of drastic and rapid institutional changes discussed above. These factors were grouped in three main categories; institutional, socio-economic and physical. The main institutional determinants identified were the land reform and governance structure managing irrigation systems at the community level.

The main outcomes of Albania's radical land reform, land (in)equality and land fragmentation, play an important role on the motivation of farmers to contribute for maintenance of irrigation systems. Land inequalities among villages are found to have a negative impact on financial contributions, but a positive effect on labour contributions. In other words, more unequal communities (villages) contribute more labour than financial resources. The inclination of farmers to contribute more labour than financial resources is attributed to the subsistence orientation of Albania's agriculture and the lack of scale economies. Farm activities in Albanian agriculture are still dominated by labour-intensive traditional practices due to low level of investments and use of agricultural technology (JOJIÇ et al., 2009). As regression results in The explanatory variables accounting for the outcomes of land reform, namely land fragmentation and land inequality, show different results in terms of their effect on labour and financial contributions to canal cleaning and maintenance. Table 5-14 showed, possession of agricultural machinery has a positive effect on the propensity of farmers to contribute financial resources for canal maintenance.

These results add to the existing debate in the collective action literature, which highlights the fact that there is no straightforward relation between inequality and collective action. Important theoretical works suggest that inequality can have either positive (OLSON, 1965), negative (OSTROM, 1990), non-linear (BARDHAN & DAYTON-JOHNSON, 2002), or ambiguous (BALAND & PLATTEAU, 1999) effects on collective action. The explanation for these relationships is often found in the possible interactions of inequality with other factors, such as technological assets (BALAND & PLATTEAU, 1999) or production technologies utilised for provision of the collective good (MARCHIORI, 2014).

Land fragmentation, the other notable outcome of the land reform, has, as expected, negatively affected farmers' motivation to provide labour inputs in maintaining and cleaning irrigation and drainage canals. This finding goes in line with other studies that analysed agricultural intensification and extensification processes in Albania. STAHL (2010) found that possession of several plots with different quality attributes and varying distance from the homestead has made farmers to prioritise and allocate investments and labour inputs to the most productive plots that would give them the highest returns.

The other key institutional determinant – governance structure – that was expected to have an impact on motivation of farmers to contribute for maintenance of irrigation systems did not show any significance. Nevertheless, considering the fact that local user groups (WUOs), as explained earlier, exist only formally, this result should come as no surprise.

The socio-economic factors considered relevant for this study showed different impacts on farmers' motivation to engage in collective action for canal maintenance. Low trust levels were found to have a negative impact on farmers' incentives to contribute financial resources for maintenance of irrigation and drainage canals but no significant impact on labour contributions. Distance to markets, on the other hand, was found to have a mixed impact on the different types of contributions. The more distant villages were found to contribute more labour and less financial resources. This suggests that exit options in terms of off-farm employment opportunities for distant villages are more limited than for villages closer to urban areas.

Meanwhile, contrary to the expectations, larger communities appear to be more involved in collective action for canal maintenance. The expectation in this case was that smaller communities will contribute more resources, which would have followed OLSON'S (1965) argument that rational, self-interested individuals will not act to achieve the common interest of the group unless the number of individuals in the group is small (p. 2). However, as OSTROM (1997) points out, the impact of group size on collective action is usually mediated by a variety of other factors. In the Albanian case, the communal and administrative organisation in rural areas is such that larger communities (villages) are generally the administrative and economic centres of a particular local administration (Komuna). As a result, these (larger) communities would attract more attention and consequently more investments and development projects from government authorities and donor organisations.

In terms of physical attributes, farmers' perceptions over fulfilment of their water needs during irrigation season reveal high water scarcities, which have negatively affected farmers' labour contributions for maintenance of irrigation and drainage canals.

6.3 RESILIENCE AND ADAPTATION OF LOCAL COMMUNITIES

The third part of the analysis explored the main adaptation strategies and actions undertaken at the local and higher scales that can contribute to the resilience of social and ecological systems. Linking household strategies for agricultural and livelihood diversification directly to climate change parameters proved, however, to be rather complex. Literature suggest that cultural, socio-economic and environmental drivers of change are intimately linked (ADGER, 1999), and in order to discern the key factors that may impact on the various strategies, an empirical assessment of the local context may be relevant (BRADSHAW et al., 2004). In this line, the analysis was based on a case study approach and relied on information from different sources including in-depth and semi-structured interviews.

The findings of the study suggest that while – in terms of crop diversification – the decision to plant summer crops (forage, vegetables) appeared to be influenced by a combination of different factors including climatic ones, the decision to avoid planting winter crops, especially wheat was mostly driven by climate factors. On the other hand, the other adaptation strategies at the individual household such as building houses and other farm facilities high above ground and at the community level, mainly the collective self-organisation undertaken by local people under the leadership of the community's priest were mainly driven by climate factors.

By adopting these strategies, the local community has shown concrete potentials to deal with uncertainties derived from climatic adverse impacts such as floods and therefore enhance the resilience of the respective social-ecological system.

Such actions and strategies should however not be viewed as exclusive to the case of Albania. Similar adaptation strategies have been found also in other developing countries, with diverse socio-cultural, economic, geographic and political contexts, and stimulated by different climate risks. For example, crop and income diversification strategies are found to have been adopted by farmers in rural Sahel, South Africa and Mozambique as a response strategy to droughts, although, just like in our study case, climate factors do not stand out alone as the sole drivers for adaptation (see MERTZ et al., 2009; OSBAHR et al., 2010). Construction of houses in stilt has been adopted by farmers in rural areas of Malaysia as an adaptation strategy to floods (CHAN & PARKER, 1996). Self-organisation mechanisms, on the other hand, are found to have been successfully utilised by farmers in South Africa and Mozambique (OSBAHR et al., 2010).

The adaptation strategies and measures that farmers adopt when dealing with climate risks and variability are nevertheless not confined solely to the identified strategies. For example, in Bangladesh farmers have adopted quick growing rice varieties along with high value quick growing horticulture and alternative inter cropping approach as an adaptation strategy to floods (SUMON & ISLAM, 2013). In some cases, especially in developed countries, adaptation strategies have gone in the opposite direction of crop diversification. BRADSHAW et al. (2004) found that due to the availability of crop insurance, the prairie agriculture in Canada has become more specialised.

Another key point that deserves attention when analysing adaptations to climate risks and the resilience of a social-ecological system is the involvement of higher level governance structures.

Adaptive governance and management literature on water resource management suggest that public participation and collaboration contribute to building the resilience of social and ecological systems and maintaining a desired state of the resource (CHAFFIN et al., 2014; FOLKE, 2006; HUITEMA et al., 2009; NELSON et al., 2007; PAHL-WOSTL et al., 2012; TOMPKINS & ADGER, 2004).

In our case, although a broad participation from various actors was possible to mobilise as a quick response to floods, the collaboration between different sectors (energy and agriculture), within sector government agencies and across multiple scales in the long run lacks some institutionalised coordination. Actions from the energy sector (HPPs) appear to be uncoordinated with other actors downstream the dams. Also the DB's interventions are not continuous and hardly involved any local participation.

That means that in the light of increased uncertainty in occurrence and impacts of climatic adverse events in Albania (MEFWA, 2009; WORLD BANK, 2011), also institutional arrangement related to management and governance of water resources need to be adapted to the evolving conditions (HUNTJENS et al., 2012; SMIT & PILIFOSOVA, 2001).

Recent approaches dealing with uncertainty in the management and governance of natural resources and ecosystems have stressed the need for adaptive governance. That generally involves polycentric institutional arrangements that are nested in relatively independent decision-making units operating at multiple scales, and involve local, as well as higher, organizational levels with the aim at finding a balance between decentralized and centralized control (FOLKE et al., 2005).

As findings of this study suggest, the water governance is carried out mostly at the central level, with very limited involvement of the local government. That may add further constrains for adaptation to climate impacts and opportunities may not be exploited given that institutional interaction across organizational levels can increase the diversity of response options and can deal more appropriately with uncertainty and change.

6.4 POLICY IMPLICATIONS

Although the Albanian government has, through donor support, undertaken several institutional and financial interventions for improving the management of water resources, the results of this study show that Albania's water sector still faces several challenges.

First, the devolution policy as one of the key institutional reforms that aimed at transferring the management of irrigation systems to local communities has not yielded the expected results. Most of local water user groups (WUA/O) have either ceased functioning or exist only formally. The failure of water user groups has often been attributed to their inability to sustain themselves in the long-run, because of intrinsic weakness in most of operational activities such as fee collection, water allocation and maintenance works (WORLD BANK, 2012). Placing the blame for the failure on local user groups alone can be misleading, however.

Despite the fact that WUOs have received some responsibilities at the operational level, they lack significant autonomy in applying collective-choice arrangements. Any collective decision to be taken by WUOs, i.e. amending the WUO's statute, requires certification by the Ministry of Agriculture, Rural Development and Water Administration. That means that the Ministry has the institutional power to reject or accept any change that occurs in WUO's functioning. Also, the irrigation infrastructure has only been partly transferred to WUOs, leaving water sources (reservoirs and pumping stations) and primary canals under the responsibility of Drainage Boards. As a result, the water allocation process undergoes a complicated procedure involving three levels of actors; farmers submit water requests to WUOs, which collect all requests and submit them to Drainage Boards. Drainage Boards would then have to deliver the requested amount to WUOs and WUOs to individual farmers. After delivering the requested amount, Drainage Boards will have to monitor whether the delivered amount has reached farmers' fields. This whole process will consequently involve high transaction costs without even ensuring that farmers will receive irrigation water on time, when they need it. Therefore, a relevant institutional and policy intervention would be to transfer the entire irrigation infrastructure to WUOs and granting them the necessary autonomy to design, amend and modify their own rules. This would provide an essential platform for encouraging higher community involvement, investments in infrastructure and lower transaction costs. In this way, farmers would perceive they have property rights over the system and the necessary autonomy to change and modify the operational rules according to the emerging circumstances. Many empirical studies suggest that when local communities are capable of developing their own collective-choice rules for formulating, modifying, changing and enforcing operational rules, these institutional arrangements will be more robust and long-lasting (OSTROM et al., 2011; TANG, 1992).

However, by simply granting autonomy and allocating property rights over the entire system does not mean that WUOs will automatically perform better and that water users will engage in collective action. Some organisational experience and especially trustworthy leadership may be required in order to avoid the elites taking control of the local organisation. Experience in other transition countries has shown that powerful individuals use their influence to maintain opportunistic strategies concerning water allocation and resist any rule change that goes against their interests (see THEESFELD, 2004). In this study, it was shown that when there is trustworthy leadership, the local community is more likely to engage in collective action, contribute to the common good and self-organise for dealing with unexpected events. Hence, before embarking on policy reforms that aim at increasing the role of communities in natural resource management, it can be appropriate if policy-makers collaborate with local communities in identifying trustworthy individuals that show leadership potentials and that have the support of the majority of community members. In case these individuals lack leadership and organisational experience, offering training in improving these skills would be another important investment for long term sustainable governance of natural resources in general and irrigation systems in particular.

Second, paying attention to and enhancing the role of local water user groups is relevant not only for the management of irrigation systems, but also for the integrated water resource management strategy adopted by the Albanian government as an approach to aligning the water legislation with the EU's WFD. This integrative approach calls for inputs and participation of different sectors and actors with a stake in water resources so that it fulfils its basic aims for sustainable management of water resources. Given that farmers are the largest water consumers, their inputs and participation in decision-making need to be taken into account. Currently, WUOs are the only local level entity directly involved in the management of water resources.

And finally, considering Albania's climate change prospects that foresee increased uncertainty in occurrence and impacts of climatic adverse events in Albania, the institutional arrangements concerning the management and governance of water resources need to be adapted to the evolving conditions (HUNTJENS et al., 2012; SMIT & PILIFOSOVA, 2001). Also, adaptation strategies and actions undertaken by different actors require some coordination.

As findings of this study suggest, lack of coordination may add further constrains for adaptation to climate impacts and opportunities may not be exploited given that institutional interaction across organizational levels can increase the diversity of response options and can deal more appropriately with uncertainty and change.

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ANNEX 1 – LOGISTIC REGRESSION TABLES AND DIAGNOSTIC TESTS

Table A-1: Results of logistic regression for probability of financial contributions to canal maintenance

FIN_CONT	Coef.	Robust Std. Err.	Z	P>z	[95 % Conf.	Interval]
LAND	-5.652	2.396	-2.36	0.018	-10.349	-0.956
PLOT_NUM	0.045	0.202	0.22	0.822	-0.351	0.442
TRUST	-2.520	1.204	-2.09	0.036	-4.880	-0.160
GOVERNANCE	0.293	0.637	0.46	0.645	-0.955	1.541
NUMUSER	0.002	0.0012	2.14	0.032	0.00022	0.0050
WATNEEDS	-0.102	0.209	-0.49	0.624	-0.513	0 .307
MARKET	-0.115	0.047	-2.46	0.014	-0.2082	-.0234
TAIL	0.154	0.550	0.28	0.779	-09252	1.234
MACHINERY	1.297	0.378	3.43	0.001	0.556	2.039
SHKODRA	2.152	0.540	3.98	0.000	1.093	3.210
_cons	2.150	1.193	1.80	0.072	-0.188	4.490

No. observations= 150; Model Chi-square = 150.67with 10 degrees of freedom; p = 0.0000; Pseudo R2=0.2215.

Source: Authors' calculation based on field survey carried out in 2013.

Notes: Robust standard errors adjusted to 12 village clusters in parentheses; ***Significant at 0.01 probability level, **Significant at 0.05probability level, *Significant at 0.10 probability level.

Table A-2: Goodness-of-fit tests for financial contributions

Method	Chi-Square	DF	P-Value
Pearson	136.15	129	0.3161
Hosmer-Lemeshow	12.03	8	0.1498

No. observations= 150.

Source: Authors' calculation based on field survey carried out in 2013.

Table A-3: Classification table for financial contributions

	-------- True --------		
Classified	D	~D	Total
+	50	20	70
-	24	56	80
Total	74	76	150

Classified + if predicted Pr(D) >= .5

True D defined as FIN_CONT != 0

Sensitivity	Pr (+ D)	67.57 %
Specificity	Pr (-~D)	73.68 %
Positive predictive value	Pr (D +)	71.43 %
Negative predictive value	Pr (~D -)	70.00 %
False + rate for true ~D	Pr (+~D)	26.32 %
False – rate for true D	Pr (- D)	32.43 %
False + rate for classified +	Pr (~D +)	28.57 %
False – rate for classified -	Pr (D -)	30.00 %
Correctly classified		70.67 %

No. observations= 150.

Source: Authors' calculation based on field survey carried out in 2013.

Figure A-1: Representation of sensitivity and specificity versus probability cutoff for financial contributions

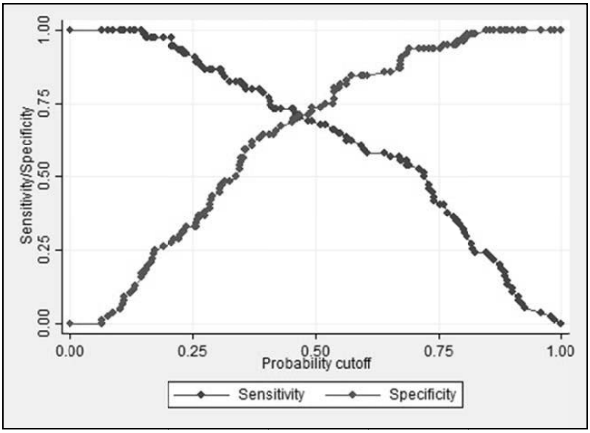

Figure A-2: ROC for financial contributions

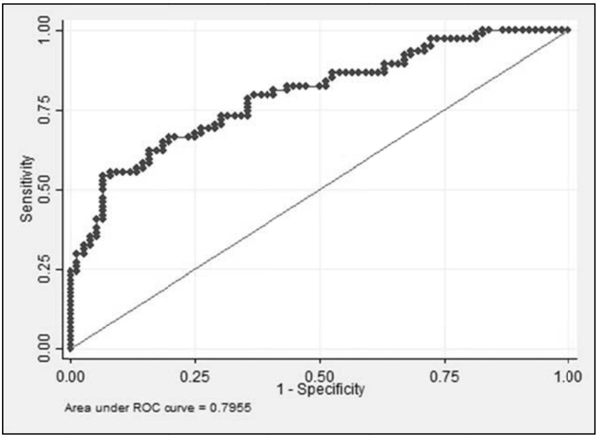

Table A-4: Results of logistic regression for probability of labour contributions to canal maintenance

LAB_CONT	Coef.	Robust Std. Err.	z	P>z	[95 % Conf	Interval]
LAND	11.41	4.78	2.38	0.017	2.031	20.770
PLOT_NUM	-0.625	0.188	-3.33	0.001	-0.993	-0.256
TRUST	-1.030	1.523	-0.68	0.499	-4.017	1.955
GOVERNANCE	-0.831	0.795	-1.05	0.296	-2.391	0.728
NUMUSER	-0.003	0.0026	-1.51	0.132	-0.009	0.0011
WATNEEDS	-0.793	0.202	-3.91	0.000	-1.190	-0.395
MARKET	0.144	0.057	2.50	0.012	0.031	0.258
TAIL	-0.148	0.384	-0.39	0.700	-0.902	0.605
MACHINERY	1.303	0.868	1.50	0.133	-0.397	3.005
SHKODRA	-1.479	0.719	-2.06	0.040	-2.889	-0.070
_cons	0.040	1.585	0.03	0.980	-3.066	3.148

No. observations= 150; Model Chi-square = 304.24 with 10 degrees of freedom; p = 0.0000; Pseudo R2=0.2761.

Source: Authors' calculation based on field survey carried out in 2013.

Note: Robust standard errors adjusted to 12 village clusters in parentheses; ***Significant at 0.01 probability level, **Significant at 0.05probability level, *Significant at 0.10 probability level.

Table A-5: Goodness-of-fit test for labour contributions

Method	Chi-Square	DF	P
Pearson	112.64	129	0.8468
Hosmer-Lemeshow	10.95	8	0.2044

No. observations= 150.

Source: Authors' calculation based on field survey carried out in 2013.

Table A-6: Classification table for labour contributions

	-------- True --------		
Classified	D	~D	Total
+	7	8	15
-	18	117	135
Total	25	125	150

Classified + if predicted Pr(D) >= .5

True D defined as LAB_CONT != 0

Sensitivity	Pr (+ D)	28.00 %
Specificity	Pr (-~D)	93.60 %
Positive predictive value	Pr (D +)	46.67 %
Negative predictive value	Pr (~D -)	86.67 %
False + rate for true ~D	Pr(+~D)	6.40 %
False – rate for true D	Pr (- D)	72.00 %
False + rate for classified +	Pr(~D +)	53.33 %
False – rate for classified -	Pr (D -)	13.33 %
Correctly classified		82.67 %

No. observations= 150.

Source: Authors' calculation based on field survey carried out in 2013.

Figure A-3: Representation of sensitivity and specificity versus probability cutoff for labour contributions

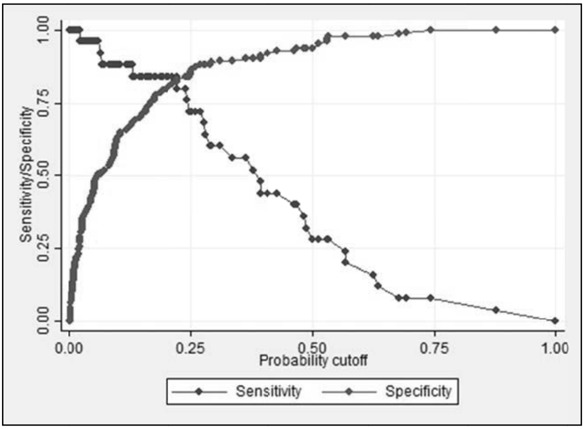

Figure A-4: ROC for labour contributions

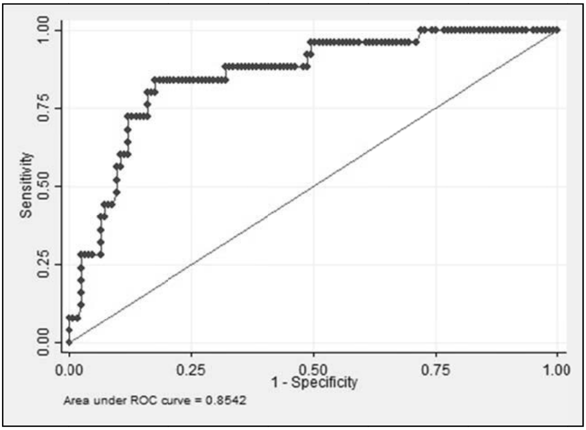

Table A-7: Test for multicollinearity (VIF)

Variable	VIF	1/VIF
MARKET	2.62	0.382299
SHKODRA	2.54	0.392946
GOVERNANCE	2.27	0.439844
WATNEEDS	2.15	0.465056
NUMUSER	1.87	0.535583
LAND	1.36	0.737864
TRUST	1.35	0.741905
TAIL	1.32	0.758385
MACHINERY	1.12	0.895354
PLOT_NUM	1.10	0.907707
Mean VIF	1.77	

N=150.

Note: Test statistics for the variance inflation factor have been derived with **vif** command in STATA 13.1.

Table A-8: Test for multicollinearity (collin)

Variable	VIF	SQRT VIF	allerance	R-Squared
LAND	1.36	1.16	0.7379	0.2621
PLOT_NUM	1.10	1.05	0.9077	0.0923
TRUST	1.35	1.16	0.7419	0.2581
GOVERNANCE	2.27	1.51	0.4398	0.5602
NUMUSER	1.87	1.37	0.5356	0.4644
MARKET	2.62	1.62	0.3823	0.6177
WATNEEDS	2.15	1.47	0.4651	0.5349
TAIL	1.32	1.15	0.7584	0.2416
MACHINERY	1.12	1.06	0.8954	0.1046
SHKODRA	2.54	1.60	0.3929	0.6071
Mean VIF	1.77			

N=150.

Note: Test statistics for the variance inflation factor have been derived with **collin** command in STATA 13.1.

ANNEX 2 – STATA CODE

///**Survey data from 2013**///

import excel "D:\Dokumentat\Thesis Documents\Fieldwork 2\Stata\Database Fieldwork.xlsx", sheet("Sheet1")

///Authority for fee collection///

label define Authority 0 "No fee payment" 1 "WUO" 2 "Local Government" 3 "Drainage Board" 4 "Government" 5 "Other"

label values fee_coll Authority

sort LOCATION

tabfee_coll in 1/38 & 75/112

///Participation in local user groups///

sort LOCATION

tabassoc_type in 1/38

tabassoc_type 75/112

sort SHKODRA

tabpartic_meet

kwallisparticip_meet, by(SHKODRA)

///Authority for water monitoring///

label define monitoring 0 "No fee payment" 1 "WUO" 2 "Local Government" 3 "Drainage Board" 4 "Government" 5 "Other"

label values wat_monit monitoring

sort LOCATION

tabwat_monit in 1/38 & 75/112

///Perception of authority for canal maintenance///

```
gen maint_can1_1 if maint_can1 != 0 & maint_can1 != 99
gen maint_can2_1 if maint_can2 != 0 & maint_can2 != 99
gen maint_can3_1 if maint_can3 != 0 & maint_can3 != 99
gen maint_drain2_1 if maint_drain2 != 0 & maint_drain2 != 99
gen maint_drain3_1 if maint_drain3 != 0 & maint_drain3 != 99
label values maintenance canmanagement
label define canmanagement 1"Farmers" 2 "WUO" 3 "Drainage Board" 4
"Commune" 5 "Government" 6 "other"
```

///Perception of authority for canal maintenance, by Governance///

```
sort GOVERNANCE
tab maint_can1_1
kwallis maint_can1_1, by(GOVERNANCE)
tab maint_can2_1
kwallis maint_can2_1, by(GOVERNANCE)
tab maint_can3_1
kwallis maint_can3_1, by(GOVERNANCE)
tab maint_drain2_1
kwallis maint_drain2_1, by(GOVERNANCE)
tab maint_drain3_1
kwallis maint_drain3_1, by(GOVERNANCE)
```

///Perception of authority for canal maintenance, by Region///

```
sortShkodra
tab maint_can1_1
```

kwallis maint_can1_1, by(Shkodra)

tab maint_can2_1

kwallis maint_can2_1, by(Shkodra)

tab maint_can3_1

kwallis maint_can3_1, by(Shkodra)

tab maint_drain2_1

kwallis maint_drain2_1, by(Shkodra)

tab maint_drain3_1

kwallis maint_drain3_1, by(Shkodra)

///Perception of system condition///

label define scale 1 "very bad" 2 "bad" 3 "moderate" 4 "good" 5 "very good" 99 "don't know"

label values syst_cond scale

label values can1_cond scale

label values can2_cond scale

label values can3_cond scale

label values drain_cond scale

///Perceived condition of irrigation and drainage canals, by Governance///

sort GOVERNANCE

tabsys_cond

kwallissys_cond, by(GOVERNANCE)

tab can1_cond

kwallis can1_cond, by(GOVERNANCE)

tab can2_cond

kwallis can2_cond, by(GOVERNANCE)

tab can3_cond

kwallis can3_cond, by(GOVERNANCE)
tabdrain_cond
kwallisdrain_cond, by(GOVERNANCE)

///Perceived condition of irrigation and drainage canals, by Region///
sort SHKODRA
tabsys_cond
kwallissys_cond, by(SHKODRA)
tab can1_cond
kwallis can1_cond, by(SHKODRA)
tab can2_cond
kwallis can2_cond, by(SHKODRA)
tab can3_cond
kwallis can3_cond, by(SHKODRA)
tabdrain_cond
kwallisdrain_cond, by(SHKODRA)

///Occurrence of Contributions by Governance///
sort GOVERNANCE
by GOVERNANCE: tab FIN_CONT
by GOVERNANCE: tab LAB_CONT

///Occurrence of Contributions by Region///
sortShkodra
byShkodra: tab FIN_CONT
byShkodra: tab LAB_CONT

///Contributions to maintenance of different canals, by Governance///

```
sort GOVERNANCE
tab cont_can1
kwallis cont_can1, by(GOVERNANCE)
tab cont_can2
kwallis cont_can2, by(GOVERNANCE)
tab cont_can3
kwallis cont_can3, by(GOVERNANCE)
tab cont_drain2
kwallis cont_drain2, by(GOVERNANCE)
tab cont_drain3
kwallis cont_drain3, by(GOVERNANCE)
```

///Contributions to maintenance of different canals, by Region///

```
sortShkodra
tab cont_can1
kwallis cont_can1, by(Shkodra)
tab cont_can2
kwallis cont_can2, by(Shkodra)
tab cont_can3
kwallis cont_can3, by(Shkodra)
tab cont_drain2
kwallis cont_drain2, by(Shkodra)
tab cont_drain3
kwallis cont_drain3, by(Shkodra)
```

///Correlation tables of contributions///

pwcorr FIN_CONT cont_can1 cont_can2 cont_can3 cont_drain2 cont_drain3, star(0.05)

pwcorr LAB_CONT cont_can1 cont_can2 cont_can3 cont_drain2 cont_drain3, star(0.05)

///Specification of variables for regression analysis///

sort LOCATION

renamecont_fin FIN_CONT

renamecont_lab LAB_CONT

renameplot_num PLOT_NUM

rename governance GOVERNANCE

renamemarket_distance MARKET

gen TAIL=0

replace TAIL=1 if location==3 | location==6 | location==9 | location==12

renamewat_needs WATNEEDS

label define wat_needs 1 "more than I need" 2 "all my needs" 3 "3/4 of needs" 4 "1/2 of needs" 5 "1/4 of needs" 6 "none of needs" 99 "don't know"

rename machinery MACHINERY

*****Gini coefficient named as LAND*****

gen LANDSIZE = tot_land + rent_in_size

ineqdeco LANDSIZE, by(LOCATION)

///save gini coefficient in excel sheet and export to a separate stata file///

merge m:1 LOCATION using "C:\Users\Klodi\Desktop\GINI.dta"

renamegini LAND

///Preparing variables for measuring Trust///

```
gen d17_2_1 = d17_2 if d17_2<88
gen d17_3_1 = d17_3 if d17_3<88
gen d17_4_1 = d17_4 if d17_4<88
gen d17_5_1 = d17_5 if d17_5<88
gen d17_6_1 = d17_6 if d17_6<88
gen d17_7_1 = d17_7 if d17_7<88
gen d17_8_1 = d17_8 if d17_8<88
gen d17_9_1 = d17_9 if d17_9<88
gen d17_10_1 = d17_10 if d17_10<88
```

*****Trust*****

///Factor analysis for ordinal data (likert scale) for variable TRUST///

```
quietlypolychoric d17_1_1 d17_2_1 d17_3_1 d17_4_1 d17_5_1 d17_6_1
d17_7_1 d17_8_1 d17_9_1 d17_10_1
display r(sum_w)
global N = r(sum_w)
matrix r = r(R)
factormat r, n($N) forcepsd factors(4) ipf
alpha d17_1_1 d17_2_1 d17_3_1 d17_4_1 d17_5_1 d17_6_1 d17_7_1 d17_8_1
d17_9_1 d17_10_1, item
```

////After selecting the second factor (with the highest impact)///

```
gen a=0.5193* d17_3_1+0.6953* d17_5_1+0.6690* d17_7_1
///the weights have been obtained from factor analysis for factor 2///
gen b=0.5193* d17_3_1+0.6953* d17_5_1+0.6690* d17_7_1+0.3748*
d17_6_1+0.3696* d17_8_1
```

///Constructing variable TRUST using Janssen's approach//

```
gen TRUST= (d17_3_1+ d17_5_1+ d17_6_1+ d17_7_1+ d17_8_1-4)/16
```

***** Regional dummies*****

sortregion

gen SHKODRA=0

replace SHKODRA = 1 if region == 1

gen LUSHNJA = 0

replace LUSHNJA = 1 if region == 2

///Descriptive Statistics///

sugini PLOT_NUM TRUST GOVERNANCE NUMUSER WATNEEDS MARKET TAIL machinery Shkodra

///Logistic regressions output////

logit LAB_CONT gini PLOT_NUM TRUST GOVERNANCE NUMUSER WATNEEDS MARKET TAIL machinery Shkodra, vce(cluster LOCATION)

estimates store m1

logit FIN_CONT gini PLOT_NUM TRUST GOVERNANCE NUMUSER WATNEEDS MARKET TAIL machinery Shkodra, vce(cluster LOCATION)

estimates store m2

outreg2 [m1 m2] using sipasformules66.xls, bdec(3) ctitle(1 2 3) word e(F r2_b r2_w r2_o) alpha(0.01, 0.05, 0.1)

///Goodness-of-fit tests for labour contributions///

logit LAB_CONT gini PLOT_NUM TRUST GOVERNANCE NUMUSER WATNEEDS MARKET TAIL machinery Shkodra, vce(cluster LOCATION)

lfit

lfit, group(10)

lstat

lroc

lsens

///**Goodness-of-fit tests for financial contributions///**

```
logit FIN_CONT gini PLOT_NUM TRUST GOVERNANCE NUMUSER WATNEEDS MARKET TAIL machinery Shkodra, vce(cluster LOCATION)
lfit
lfit, group(10)
lstat
lroc
lsens
```

///Variance Inflation Factor (VIF) test///

```
reg FIN_CONT gini PLOT_NUM TRUST GOVERNANCE NUMUSER WATNEEDS MARKET TAIL machinery Shkodra, vce(cluster LOCATION)
vif
collin
```

///Changes in water availability///

```
label define Perception 1 "More" 2 "The same" 3 "Less"
label values percep_change Perception
label values percep_future Perception
label values fut_syst_cond scale 1 "very bad" 2 "bad" 3 "moderate" 4 "good" 5 "very good" 99 "don't know"
sort SHKODRA
by SHKODRA: tab wat_change
by SHKODRA: tab percep_change
by SHKODRA: tab percep_future
kwallispercep_change, by(Shkodra)
kwalliswat_change, by(Shkodra)
kwallispercep_future, by(Shkodra)
```

ANNEX 3 – HOUSEHOLD QUESTIONNAIRE

Greetings!! My name is Klodjan Rama and I am a doctoral student at the Leibniz Institute of Agriculture Development in Central and Easter Europe, located in Halle/Saale, Germany. I am conducting a research to analyse the issues of water management related especially to maintenance of irrigation and drainage canals in your community. I would therefore be pleased if you would devote some time to make an interview with you. Your responses will be completely anonymous, confidential and the findings will never discuss individual responses. This survey will take about one hour.

Interview Type: ________________________

Interview No.: ____

Date: ___________ Duration:_________ min

Location: ____

Respondent:

Age: ______ [1] male [2] female

Education: ____________________________

Profession/status: ____________________________

Family status: ____________________________

Atmosphere, interaction/problems during the interview:

____

____

Establishing of contact:

____

Check: Declaration of consent has been offered/signed? Business card has been provided? Interviewee shows interest in research findings?

A. SOCIO-DEMOGRAPHIC DATA:

A1. How many people including you live in your household? __________
A2. How many of the family members are between 0-14? _____________
A3. How many of the family members are over 65 years old? __________
A4. How long has your family (ancestors) lived in this community? YEARS
A5. What is your main source of incomes?

Agriculture	Emigration	Off-farm	Other (Specify)
1	2	3	4

A6. Average share of your income for the marked activit(y)ies:

Agriculture	Emigration	Off-farm	Other (Specify)
____%	_____%	______%	_______%

A7. Please give approximate figures about: (this is now a rather big step, not so much related to the topic beforehand, why don´t you place it after a5a?)

a. Livestock (number)	
b. Greenhouse (ha)	
c. Fruit-trees (number or ha?)	
d. Vineyards (number or ha?)	
e. Machinery (no)	
f. Other	

A8. Do you own agricultural land?
[1] YES **[0] NO**
A8a. How large is it?

Total land surface including the house garden (ha)		
Plots (number) and the size of each plot in ha		

A8b. How much of this do you officially own? _______________
A8c. How much of this do you use for agriculture? ________________
A8d. Do you rent land in/out? **[1] YES** **[0] NO**
A8e. How much do you rent in/out? ________/__________
A8f. From/to whom do you rent in/out? __________________________________

A9. Did you get your land from the reform (Law 7501) or you took back the ancestral land?
[1] Land reform **[2]** Ancestral land
A9a. Do you have land title for your land?
[1] YES **[0] NO**
A9b. How secure do you feel about the land you own and use?

Very much	Much	Moderate	Little	Not at all
1	2	3	4	5

A10. Did you ever have conflict related to your land?
[1] YES **[0] NO**
A10a. **If YES**, when did it happen?

Last year	2 years ago	5 years ago	10 years ago	20 years ago
1	2	3	4	5

A10b. What were the reasons for the conflict? ____________________________________
A10c. How was the conflict solved? ____
A10d. Who solved the conflict? ____
A11. Do you plant any of the below crops? (**Yes – 1**, **No – 0**, **Don't know – 99**)

	Crops	1	2	3	4	5	6	7	8	9	10	11
Code		**Wheat**	**Maize**	**Alfalfa**	**Vegetables (green-house)**	**Veg. (no green-house)**	**Onions**	**Water melon**	**Vineyard**	**Pasture**	**Land fallow**	**Other**
A11	Do you plant:	1 - YES 0 - NO 99 - D.K	1 - YES 0 - NO 99 - D.K	1 - YES 0 - NO 99 - D.K	1 - YES 0 - NO 99 – D.K	1 - YES 0 - NO 99 - D.K	1 - YES 0 - NO 99 - D.K	1 - YES 0 - NO 99 - D.K	1 - YES 0 - NO 99 - D.K	1 - YES 0 - NO 99 - D.K	1 - YES 0 - NO 99 - D.K	1 - YES 0 - NO 99 - D.K
A11a	How many (ha)											
A11b	Total yield (ton)											
A11c	How much sold (ton)											
A11d	Average price											

A12. What is the main use of the crops and their share?

Sold	1	Kg/ton	%
Used for subsistence	2	Kg/ton	%
Other (specify)	3	Kg/ton	%

A13. If sold, where is it sold?

Market	1
Picked at the farm	2

A14. How far is the market from your farm? __________hours_______km

A14a. How far is the next main road? ___________km

A15. How do you reach the market?

Public transport	1
Own car	2
Other (specify)	3

A16. Do you have any contractual relation with any dealer for any product?

[1] YES **[0] NO**

A17. What products? ____

B. RESOURCE CHARACTERISTICS

B1. Do you irrigate your land? (a e ujitni token?)

[1] YES **[0] NO**

B1a. How much of your land is irrigated (water)?

Irrigated land (ha)	
Number of plots	

B1b. Did all land/ plots have irrigation when you received the land/when you started farming?

[1}YES **[0] NO**

B1c. If YES, how much/many plots were under irrigation when you started farming?

Irrigated land (ha)	
Number of plots	

B2. If you irrigate the land, where do you get the water from?

Surface irrigation systems	Groundwater pumping	Rainfall
1	2	3

B3. If 1, Is the surface irrigation system:

Gravity system	Pumping system
1	2

B4. Which crops are planted in the irrigated land/plots? **(1 = yes; 0 = no; 99 = don't know)**

	Crop				Irrigation Mode (refer to quest. B2 for coding)		
1	Wheat	1	2	99	1	2	3
2	Maize	1	2	99	1	2	3
3	Alfalfa				1	2	3
4	Vegetables (greenhouse)	1	2	99	1	2	3
5	Veg. (no greenhouse	1	2	99	1	2	3
5	Onions	1	2	99	1	2	3

6	Potatoes	1	2	99	1	2	3
10	Water melon	1	2	99	1	2	3
11	Perennial plants: Orchards/nuts	1	2	99	1	2	3
12	Vineyards	1	2	99	1	2	3
13	Land fallow	1	2	99	1	2	3
14	Pasture	1	2	99	1	2	3
15	Other (indicate)	1	2	99	1	2	3

B5. Is the water for irrigation enough for you? **[1] YES** **[0] NO**

B6. For how many months do you get water? ____________________

B7. How much of your water needs is met?

More than I need	1
All my needs	2
About three quarters	3
About half of my needs	4
About quarter of my needs	5
Almost nothing	6

B8. Have there been conflicts related to water allocation?

[1] YES **[0] NO**

B8a. If YES, how many times? ________________________________

B8b. Who was involved in the conflict? __________________________

Farmers –farmer	1
Farmer- water providers from WUA/WUO	2
Farmer - water providers from government	3
other (specify)	4

B8c. Who solved the conflict? __________________________________

B9. If you use irrigation canals, where is your land located along the irrigation canal?

Head-end	Middle	Tail-end
1	2	3

B10. Are the canals out of:

Concrete	Mud	Tubes
1	2	3

B11. When was the system constructed? _____________________________

B12. How do you consider the state of the infrastructure? (So you mean how is it maintained?)

Very bad	Bad	Moderate	Good	Very good
1	2	3	4	5

C. RESOURCE GOVERNANCE

C1. Who is responsible for providing water to the irrigation canal?

WUO/FWUO	1
Local Government	2
Drainage Board	3
Government	4
Other (specify)	5
I do not know	99

C2. How is the water allocated?

Per day	1
Cubic meter	2
Land area (ha)	3
Cubic meter/day	4
other (specify)	5

C3. Do you pay for the water?

[1] YES **[0] NO** **[99] Don'tknow**

C4. If YES, how much do you pay?

____________________ .per year
____________________ per cubic meter
_____________________per ha
_____________________other

C5. Can you roughly estimate how much water do you get?

_______________________ per hectare
_______________________ per day
_______________________ per cubic meter

C6. To whom do you pay the money?

WUO/FWUO	1
Local Government	2
Drainage Boards	3
Government	4
Other (specify)	5

C7. Who monitors how much water you receive?

WUO/FWUO	1
Local Government	2
Drainage Boards	3
Government	4
Other (specify)	5

C8. What happens if you don't pay the fees? ___________________________________

____

C9. Has there been any sanctioning if you don´t pay? _______________________________________

____

C10. Have there been investments in the irrigation and drainage infrastructure during the last 20 **years?**

[1] YES **[0] NO**

C10a. Who carried them out?

Farmers	1
WUO/FWUO	2
Local Government	3
Drainage Boards	4
Government	5
Other (specify)	6

C11. If YES, how often were performed? If NO, go to question C14

Once a year	Every 3 years	Every 5 years	More than 10 years
1	2	3	4

C12. Where did investments take place?

Reservoir	1
Pumping station	2
Primary canals	3
Secondary canals	4
Tertiary canals	5
Drainage canals	6
I don't know	99

C13. What kind of investment took place? ____________________________________

____

C14. Have the irrigation and drainage canals ever been cleaned:

[1] YES **[0] NO**

C15. If YES, when was the last time? If NO, go to C16

Last year	Three years ago	Five years ago	More than 10 years ago
1	2	3	4

C15a. Which canals have been cleaned?

Primary canals	1
Secondary canals	2
Tertiary canals	3
Drainage canals	4

C16. How would you define the quality of the irrigation and drainage system?

Very bad	Bad	Moderate	Good	Very good
1	2	3	4	5

C16a. How would you define the quality (condition) of the tertiary canals?

Very bad	Bad	Moderate	Good	Very good
1	2	3	4	5

C16b. How would you define the quality (condition) of the secondary canals?

Very bad	Bad	Moderate	Good	Very good
1	2	3	4	5

C16c. How would you define the quality (condition) of primary canals?

Very bad	Bad	Moderate	Good	Very good
1	2	3	4	5

C16d. How would you define the quality (condition) of drainage canals?

Very bad	Bad	Moderate	Good	Very good
1	2	3	4	5

C17. Have you ever contributed in maintenance/investment of irrigation and drainage canals?

[1] YES **[0] NO**

C17a. If **YES**, did you contribute? If **NO** go to **C27**

Money	1
Labour	2
Other (specify)	3

C17b. If **YES** For cleaning of which canals did you personally contribute?

Primary canals	1

Secondary canals	2
Tertiary canals	3
Drainage canals	4

C17c. If **YES**, when was the last time you undertook cleaning operations

Last year	Three years ago	Five years ago	More than ten years ago
1	2	3	4

C18. If you contributed money, how much money did you have to pay? ____________

C19. To whom do you have to pay money?

WUO/FWUO	1
Local Government	2
Drainage Boards	3
Government	4
Other (specify)	5

C20. If you contributed labour, how much/many

Hours/day	
Days/season	
Labour/unit (krahe/pune)	
Other (specify)	

C21. What about the others, how do other community members contribute?

____

C22. What happens if you don't contribute? (for instance, do you get water next season? do you have to pay a penalty? Do other members of the community distance from you?)

____
____

C23. What happens if you contribute, and other community members don't?

____
____

C24. Have there ever been conflicts related to this issue?

[1] YES **[0] NO**

C25. Who were the actors involved:

Farmers	1
Farmer - water providers from WUA/WUO	2
Farmer- water providers from government	3
Farmer-local government	4
Other (specify)	5

C26. Who /How was solved? ____
____
____

C27. If no, who is supposed to maintain:

Primary canals		Farmers	1
		WUA/	2
Secondary canals		Drainage Boards	3
		Local Government	4
Tertiary canals		Government	5
		Other (please specify	6

D. Community Characteristics

D1. Have you or any in your household participated in voluntary work related to managing, conserving, or monitoring the common resources in your village during the last year?

[1] YES, how many days per year? **[0] NO**

D2**.** Have you or any in your household **EVER** participated in voluntary work related to managing, conserving, or monitoring the common pool of natural resources in your village?

[1]YES **[0] NO**

D3. What kind of activities? Please list and explain!

____
____
____
____

D4. Are you a member of any organization/association that operates in your community?

[1] YES **[0] NO** If no, go to question **D12**

D5. How is this organization/association organised?

____
____
____
____

D6. Since when does the organization/association function? ________________

D7. Do you have to pay dues?

[1] YES **[0] NO**

D7a. How much? ______________________

D8. How often does it (the organization/association) meet?

Once a month	Once 3 months	Once 6 months	Once a year	Never
1	2	3	4	5

D9. Do you participate in the meetings?

[1] YES **[0] NO**

D9a. How regularly do you participate

Every meeting	Most of the meetings	Some of the meetings	Rarely	Never
1	2	3	4	5

D10. What is discussed in the meetings of the association?

____
____
____

D11. What do you expect from the association/organization?

____
____

D12. If there is no formal organization/association, is there any other form of organization in your community?

[1] YES **[0] NO**

____
____

D13. Do you ever meet with other community members to discuss about community issues?

[1] YES **[0] NO**

D14. How often/regularly do you meet?

Weekly	Monthly	Every 3 months	Twice a year	Once a year	Never
1	2	3	4	5	6

D15. Please tell me whether in general you agree or disagree with the following statements

	Strongly Agree	Agree	Disagree	Strongly disagree
1. Most people in this village are basically honest and can be trusted.	1. ☐	2. ☐	3. ☐	4. ☐
2. People in this village are mostly interested in their own well-being	1. ☐	2. ☐	3. ☐	4. ☐
3. Members of this village are always more trustworthy than those in other villages.	1. ☐	2. ☐	3. ☐	4. ☐
4. In this village one has to be alert, or someone will take advantage of you.	1. ☐	2. ☐	3. ☐	4. ☐
5. If I have a problem there is always someone in this village to help you.	1. ☐	2. ☐	3. ☐	4. ☐
6. I do not pay attention to the opinions of others in the village.	1. ☐	2. ☐	3. ☐	4. ☐
7. Most people in this village are willing to help if you need it.	1. ☐	2. ☐	3. ☐	4. ☐
8. This village has prospered in the last five years	1. ☐	2. ☐	3. ☐	4. ☐
9. I feel accepted as a member of this village	1. ☐	2. ☐	3. ☐	4. ☐
10. If you lose a livestock, someone in the village would help look for it or would return it to you.	1. ☐	2. ☐	3. ☐	4. ☐

E. Future Water Availability

E1. Have you noticed changes in the availability of water during the past 20 years?

[1] YES **[0] NO**

E2. Is it more or is it less?

More	The same	Less
1	2	3

E3. What do you think, is it going to be more or less water in the future?

More	The same	Less
1	2	3

E4. How do you expect the infrastructure to look like in the future?

Better	Good	The same	Bad	Worst
1	2	3	4	5

E5. Do you think EU Accession is a good thing for irrigation and drainage systems?

[1] YES **[0] NO**

E6. If YES, what will be better? ____

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