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**INSTITUTIONS OF SUSTAINABILITY  
AND MULTIFUNCTIONAL LANDSCAPES**

Lessons from the Case of the Algarve

**ANDREAS THIEL**

**ICAR Discussion Paper 13/2006**

Discussion Paper

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# Institutions of Sustainability and Multifunctional Landscapes

## Lessons from the Case of the Algarve

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### **Abstract**

The paper uses function analysis to complement the analytical framework Institutions of Sustainability and to apply it for the analysis of the role of institutions for the multifunctionality of landscapes. This combination of conceptual tools is evaluated through their application to the case of landscape development in a sub-region of the Algarve, Portugal. In view of this case study it is suggested to complement the Institutions of Sustainability framework: case and transaction specific contextual factors should be included. The paper suggests to look at cross-jurisdictional agency features, cross-function, -transaction and -institutional commonalities, and interconnections as well as to include a dynamic dimension of institutional and physical time lags governing human-ecosystem relations.

**Keywords:** Multifunctional Landscape, Institutions, Portugal, European Integration

**JEL Codes:** N54, Q56, O18

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## 1 Introduction

This paper is to contribute to the discussion of the role that the analysis of institutions and governance can play for understanding the development of “landscapes” and their functionality. The term multifunctionality has been conceptualised in a variety of ways. Often clearly interest-laden, political motivations seem to explain these differences<sup>1</sup>. Also, academics deal with it from a variety of perspectives. Vatn treats multifunctionality as analytical concept drawn from economic analysis and equates it with jointness of production or the fact that “inputs cannot be assigned specifically to each output” (Vatn 2001: 5). Durand et al. expand this conception to a normative category as “new paradigm....to develop policies that stimulate rural entrepreneurship and the supply of public goods” (Durand et al. 2003: 13). Hagedorn similarly describes multifunctionality as jointness of production specific to agri-environmental practices and developed the framework “Institutions of Sustainability” (IoS) (Hagedorn et al. 2002) for their analysis. Here we adopt Wiggering et al.’s conception seemingly coming from environmental management which transposes the concept to overall landscapes and implies a normative and a positive dimension (Wiggering et al. 2003). Enlarging the scope of the concept is justified with the fact that any “type of landscape” fulfils the same functions as rural agricultural zones although they feature with different intensity (similar to Wiggering et al. 2003). Moreover, this approach seems to be justified in a time when in the European Union agriculture is supposed to broaden its objectives and mix of functions substantially (see for example Durand and Van Huylenbroeck 2003). Specifically the paper aims at evaluating the value of the IoS framework for the analysis of multifunctional landscapes as defined by Wiggering et al. (2003).

A whole range of changes occurs in the relation between society and the environment - and therefore its multifunctionality - once a territory and its inhabitants are under the influence of European integration. The IoS framework focuses the case study analysis in this paper on the role property rights, governance structures, and actors play in one empirical case of the ‘production’ of (multifunctional) landscapes. The paper will go about this task in four sections: firstly, the conceptual background will be dealt with. The concept of multifunctionality and related concepts, a framework for analysing landscape functions (function analysis), and the IoS framework is presented.

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<sup>1</sup> Hagedorn (2005) provides an overview of eight different ways of interpreting the concept, their corresponding foundation and motivation.

Second, this combination of conceptual tools is applied for analysing the way the multifunctionality of landscapes was shaped in the empirical case of a subregion of the Algarve in Portugal. The question will be how the described configuration of actors, property rights, and governance structures contributed to relative changes in functionality of the landscape between the beginning of the seventies and the present. Answering this question is to provide input for, third, reflecting about the analytical toolkit previously devised and specifically the IoS framework. Forth, suggestions will be made on how to complement the IoS framework for a dynamic analysis of the way multifunctional landscapes are shaped. Concluding the paper a summary of the key argument is presented.

## 2 Conceptual Background

### 2.1 Multifunctionality and its Analysis

Wiggering et al. (2003) adopt a twofold definition of the concept of multifunctionality of landscapes: firstly, a *descriptive/positive* conception of multifunctionality is presented in terms of technological jointness of production (functions) of landscape that actions impinge upon. Translated to social theory this positive conception describes the fact that human actions have unintended, secondary or indirect implications for the physical environment.

Secondly, they introduce a *normative* definition of how multifunctional landscapes perform. Normative multifunctionality is conceptualised as “...an attempt [...] at carrying out and implementing the concept of sustainable development in the specific case of land use and landscape development”<sup>2</sup> (Wiggering et al. 2003: 9). Multifunctional landscapes should fulfil normative standards, such as long-term conservation of biotic, abiotic, and cultural resources, economic welfare of the land users, social perspectives for the rural population and maintenance of technical and cultural infrastructure in rural areas. These standards have to be regionally differentiated. They have to be adapted according to socio-economic, environmental and landscape type criteria, and the valuation of different functions varies in reaction to contingent demands and standards of information/knowledge (Wiggering 1997).

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<sup>2</sup> In relation to the environment Wiggering et al. (2003) equate sustainable development with certain management rules: use of renewable resources may not exceed their substitution or substitution rate; the release of harmful substances may not exceed the capability of natural systems to absorb and to compensate.

Wiggering et al. (2003) furthermore make certain normative prescriptions with regard to institutional structures (property rights/governance constellation)<sup>3</sup>. In contrast, this paper distances itself from these normative procedural prescriptions. Instead, the aim is to understand what configurations shape (positive) multifunctionality of landscapes, how this can be analysed best and what configurations of elements facilitate the emergence of multifunctional landscapes in the normative sense. Some of these elements may well be included in Wiggering et al.'s prescriptions. Before introducing function analysis landscape functions are briefly defined and the concepts of 'landscape' and 'land use', 'functions of landscapes' and 'demand for land use' are related to each other.

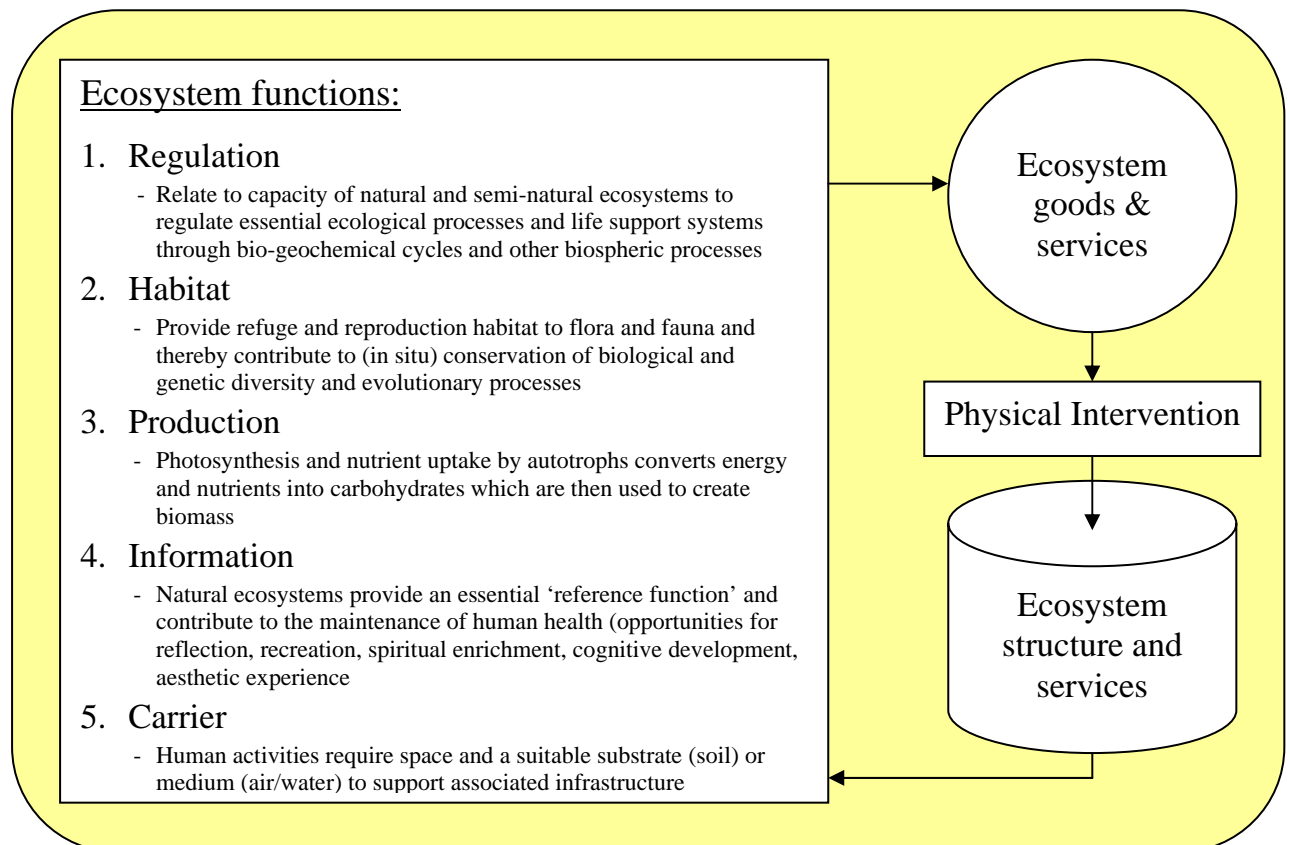
Wascher (2004) defines landscapes as "...spatially defined units which character and functions are defined by the complex and region-specific interaction of natural processes with human activities that are driven by economic, social, and environmental forces and values". This definition illustrates the heightened complexity that the IoS is confronted with in the analysis of multifunctionality of landscapes. Land use is one human activity that is undertaken in this landscape and that can fulfil various functions. De Groot (2004) equates landscape functions with ecosystem functions. They are defined as "the capacity of natural processes and components to provide goods and services that satisfy human needs, directly or indirectly" (De Groot 1992: 7). These functions play a role for the eco-system itself as well as for humans. They are interrelated and overlap which means that the quality and features of one function necessarily have an impact on the quality and features of others. Therefore, changes usually relate to more or less all functions, as well as the ecosystem and landscape changes. Multifunctionality de- (or pre-) scribes the number of functions that landscapes fulfil and their quality. As shown in Figure 1, De Groot (2004) proposes five categories of ecosystem functions. All goods and services that people demand for (land use being one of them) can be reduced to them as well as they are in a dialectical relationship to human demand. De Groot (2004) as much as Wascher (2004) introduce what could be called a biological view of landscapes. They downplay its aesthetic value and omit its significance for people's identity<sup>4</sup>. In Figure 1 ecosystem functions provide ecosystem goods and services

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<sup>3</sup> They target the process in which agreement on land use is to be achieved and property rights are defined and allocated. All demands on landscapes are considered simultaneously, all demands are seen as legitimate, extra-regional and large scale demands are to be included, property rights need to be clearly defined and decision competence is to be decentralised in line with the subsidiarity principle (Wiggering et al. 2003: 9ff.).

<sup>4</sup> Bioregionalists for example argue for an institutional configuration that builds on the identity that people associate with places and landscapes (McGinnis 1999).

which imply physical interventions. They restructure ecosystems in terms of functions and therefore also the services provided. For the purposes of this paper De Groot's (2004) categories of landscape functions are used. For analysing the functionality of a landscape the methodological challenge has to be tackled to judge the way in which a landscape/ecosystem performs in relation to ecosystem functions.



**Figure 1: Analysis of human – ecosystem relationships<sup>5</sup>**

Source: Author, adaptation of De Groot (2004).

## 2.2 The “Institutions of Sustainability” Framework

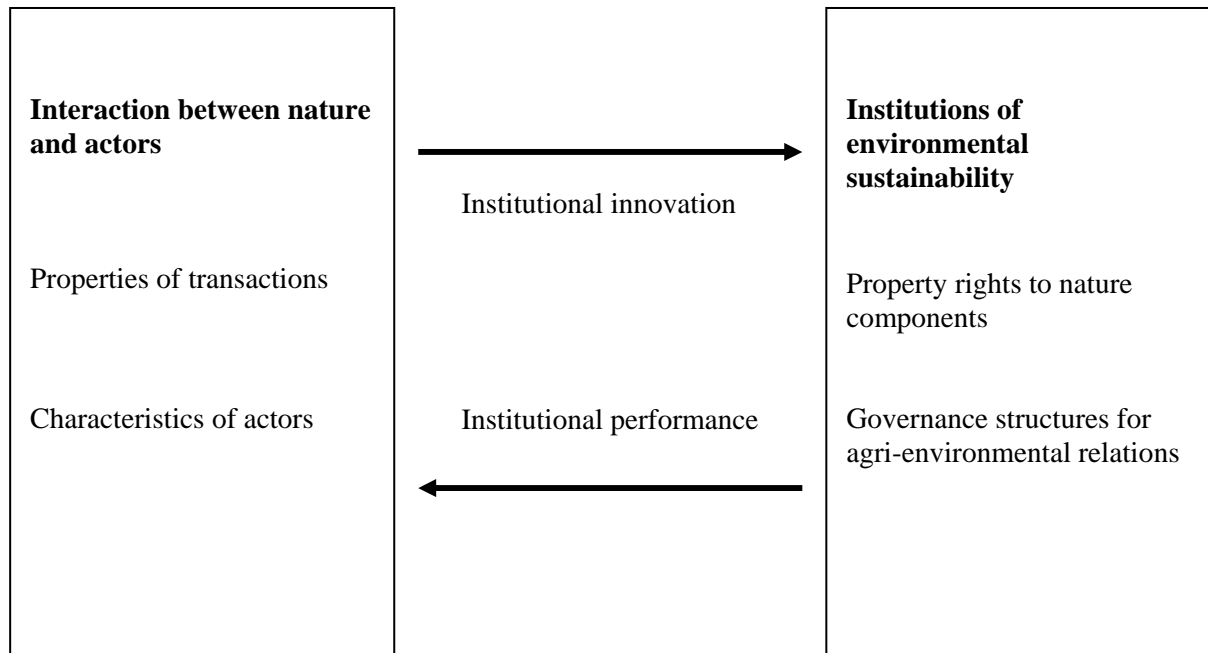
At various occasions Hagedorn proposes to analyse multifunctionality of agriculture through an analytical framework he terms “Institutions of Sustainability” (IoS) (Hagedorn 2005: 10f.; 2003: 51f.; detailed in Hagedorn et al. 2002; Gatzweiler and Hagedorn 2002). In the IoS framework “features of transactions and properties of actors are considered as determinants of institutional innovation leading to property rights on ecosystem functions and governance

<sup>5</sup> For a more detailed overview of ecosystem/landscape functions see De Groot (2004).



structures for natural resources” (Hagedorn 2005: 7f.). Contextual elements are for example the social embeddedness of the elements, the dynamic view of institutional change and the level of analysis. The IoS framework is to contribute to “institutional change for making multifunctionality of landscapes work” and therefore, Hagedorn (2005: 4f.) sees it as a “tool for increasing sustainability”. Hence the application of the IoS framework has a positive as well as a normative side to it. Based on positive analysis good design principles are to be identified that characterise families of (normative) Institutions of Sustainability whose socio-ecologic interactions are relatively more sustainable than others. In line with this process Hagedorn (2005) perceives sustainable development as “a comprehensive process of searching, learning and gaining experience”. Its results are “adequate institutions [...] effective in the various areas of society” (ibid.: 15). Building on a pool of knowledge about institutional configurations that perform better in terms of sustainability than others and which has been acquired through empirical work. The framework does not rely on any specific mode of calculation by actors such as logic of appropriateness (March and Olsen 1989), rationality or bounded rationality (Ostrom et al. 1994).

In the positive sense the IoS framework analyses already existing configurations which are either the product of long term processes of institutional formation, which emerge spontaneously or which are the product of intentional institutional design. Institutions or the institutional configuration “...are perceived as sets of interrelated rules governing given aspects of social life which are acknowledged (or sanctioned) by all or some members of society. They regulate relationships among individuals and between the social and ecological systems, i.e. rights and duties as well as costs and benefits of actions. Therefore institutions link social and ecological systems” (Gatzweiler and Hagedorn 2003: 3). They interrelate actors, socio-ecologic transactions, governance structures and property rights. Institution building is described as evolution and co-evolution, a process which is dynamic, complex and a result of co-adaptation (idem 2002). Before detailing the description, the framework is graphically reproduced in Figure 2.



**Figure 2: The Institutions of Sustainability (IoS) framework**

Source: Hagedorn et al. (2002).

Hagedorn implicitly argues that governance cannot be explained independently by any of the elements constituting the IoS framework although the usual understanding of network governance<sup>6</sup> suggests this. Instead its contingent and dialectical relation to the other elements (features of the transactions and property rights) have to be taken into account.

The IoS framework has been developed specifically based on thinking about agri-environmental practices. Therefore, it has to be answered on a conceptual level if the IoS framework can be transposed to activities shaping landscapes in general and what the implications of this transposition are. Based on Hagedorn's (2005) definition of agri-

<sup>6</sup> A process of governing which differs from other forms of governing as it is no longer exclusively conducted by the state, but involves "all those activities of social, political and administrative actors that [...] guide, steer, control, or manage society" (Kooiman 1993: 3).

environmental practices<sup>7</sup> little doubt emerges that any human-ecosystem interference, for example, land coverage, conserving ecosystems, industries polluting soil, waters or air, reshaping landscapes for aesthetic purposes or using it for recreational purposes has similar characteristics. Obviously, the degree to which they feature these interactions varies in relation to features of functions and context. Consequently, conceptually the transposition of the IoS framework to other kinds of human-ecosystem interactions is legitimate. Therefore, the question becomes more significant if the IoS framework is adequate and practical to the analysis of institutional configurations shaping multifunctional landscapes due to diverse overlapping socio-ecological relations.

The IoS framework evaluates *transactions* specifically with regard to their implications for environmental goods and services. It is not interested in the consequences of these transactions on other goods and services. Transactions regarding multifunctional agriculture are defined by Hagedorn et al. (2002) as producing environmental problems through production or consumption which implies a transaction between the farmer and the public or community concerned. Alternatively, they solve or diminish environmental problems and imply a transaction between the regulator and the farmer (see also Hagedorn et al. 2002: 6). Here we endeavour to examine the transferability of the IoS framework to the analysis of institutions governing multifunctional landscapes. As a consequence we have to broaden Hagedorn et al. (2002)'s definition of transactions. Transactions are therefore here defined as either producing or diminishing environmental problems (e.g. pollution of aquifers, sealing of soils or maintenance of habitats). Relating to environmental problems this definition implicitly considers a normative vision of the natural environment. Transactions are closely linked to the activities that cause environmental changes such as water abstraction or building activities. They impinge on other actors' property rights and lead to the need for coordination with others than those producing the physical effect (see also the definition of transactions of

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<sup>7</sup> For Hagedorn (2005: 14) the agri-environmental relationship features "actor and resource characteristics ..[where] ...different (positive and negative) effects do not accrue to the same group, the resource used for harvesting and the resource degraded by that are not identical, processes by which the resource yields benefits and simultaneously causes harm are not easily understood by the heterogeneous actors and a common understanding of the groups involved is often lacking. The resource or the environmental medium often has no clear boundaries and positive (intended) effects and negative (non-intended, side) effects materialise in different environmental media and different geographical areas" (2005: 14).

Beckmann 2002)<sup>8</sup>. This distinguishes them from activities. In economic terms, coordination can be optimal or not.

Transactions are mutually interdependent with the other elements that the IoS framework singles out. The characteristics of different types of *actors* are deeply intertwined with the transactions and underlying activities they are involved in<sup>9</sup>. The characteristics of actors are influenced but not predetermined by the transaction, as actors are able to learn from experience. For example, tourism enterprises or farmers reflect the physical conditions under which they pursue their activities. Furthermore, Hagedorn et al. (2002) single out *governance* structures for structures that supervise and sanction property rights to specific components of nature or that organise transactions<sup>10</sup>. Hagedorn et al. (2002) hereby refer to structures related to formal property rights such as plans, licensing regimes or legal rules, and the structures and entities striving to implement them. By specifying that *property rights* are defined only for components of nature Hagedorn (2005) takes account of the complex physical interrelations into which the exercise of property rights over pieces of nature are embedded. In other words, property rights to ecosystem components are always insufficiently defined in relation to effects they have on the overall ecosystem. Therefore, unaccounted for and unintended consequences are bound to happen as our knowledge of ecosystems is necessarily partial. Externalities similarly are bound to occur. The IoS framework understands property rights not only as disposition rights<sup>11</sup> focusing on physical entities but in a more specific differentiated sense. The maintenance of property rights to components of nature furthermore implies transaction costs<sup>12</sup>. The term transaction costs is, in fact, somewhat inappropriate given the

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<sup>8</sup> This definition of transactions is distinct from those definitions of transactions used by either Williamson (1985: 1): “transfer of a good or a service over a technically separable interface”, and fundamentally different from Commons’ (1934, quoted in Richter and Furubotn 1999: 38): “transfer of property rights”. Williamson’s definition resembles the field for which it was initially defined, the organisation of industrial production where transactions are obviously perceived as not at all as complex and uncertain in their physical consequences as transactions directly related to ecosystems.

<sup>9</sup> Departing from Hagedorn et al. (2002) in the case study normative legitimacy is described in the context of actors as it varies with the characteristics of actors and not with immutable characteristics of transactions.

<sup>10</sup> In this case, Hagedorn adopts a definition of governance structures similar to that of Williamson (1998: 76) who defines governance as “the means by which order is accomplished in a relation by which potential conflict threatens to undo or upset opportunities to realize mutual gains”.

<sup>11</sup> That is, rights to use, alter or alienate (Richter and Furubotn 1999: 82).

<sup>12</sup> Transactions necessarily have implications for property rights of others. Coordinating property rights imply “costs of running the economic system” (Arrow 1969: 48, quoted in Williamson 1991: 269) or transaction

terminology of Hagedorn which was described above. He equates transactions with socio-ecological interactions as argued above. One would better describe them as ‘property rights costs’ or “costs of governance” (or costs of transactions in the sense of Williamson) (Williamson 1998; 1991). We assume they nonetheless depend on the characteristics of the socio-ecologic interaction as Hagedorn et al. (2002) continues to elaborate. The distribution of either partial property rights regarding one element of nature (specialisation - high transaction costs) or bundling them (low transaction costs) has implications for transactions costs (understood as property rights costs) as well as for either central (in case of division of property rights, specialisation) or decentral (bundling of property rights, one title for all functions of element) allocation. The IoS framework originally aims at describing transactions in a static situation; therefore, it does not include a category for costs of institutional change as described by Challen<sup>13</sup>.

Here we use our transposition of Hagedorn’s definition of transactions (see above) to landscapes as ‘either producing or diminishing environmental problems and impinging on other people’s property rights’. Transaction costs are equated with governance costs. More details on the attributes of the categories IoS framework uses are provided elsewhere (Hagedorn et al. 2002; Hagedorn 2005; Gatzweiler and Hagedorn 2002).

### **3 Applying the IoS Framework and Function Analysis to the Case Study**

In terms of ecosystem functions as suggested by De Groot (1992) the IoS framework has originally been devised for looking at agri-environmental practices. Therefore, it originally

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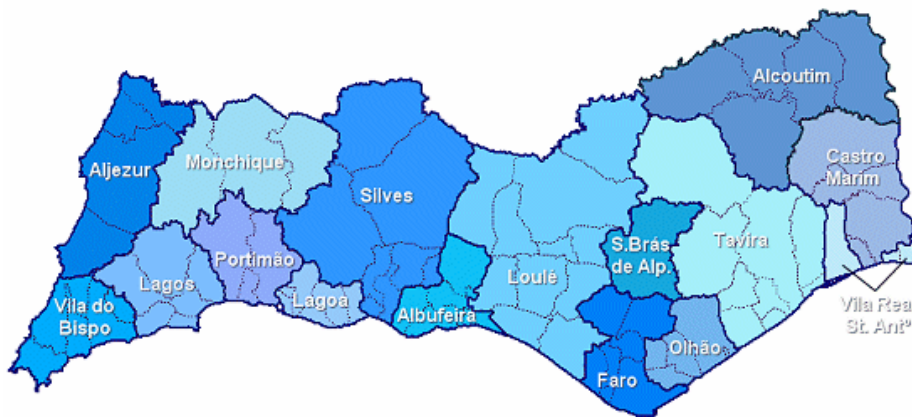
costs. Challen (2000: 28) writes “transaction costs are the costs incurred in organising and coordinating human interaction”. Borrowing from Coase (1960: 15), he details: “the costs to discover who one wants to deal with, to inform them about the wish to deal with them, the terms on which one wants to deal with them, the costs of negotiating with them, drawing up a contract and monitoring it etc.”. In several texts Williamson therefore equates transaction costs with governance costs which depend on the form of governance (see e.g. Williamson 1998, 1991).

<sup>13</sup> Challen (2000: 7) aims to analyse institutional change and introduces dynamics as process-related transition costs, “that is, the costs of decision making for institutional change and the costs of implementing institutional reforms”. Transition costs obviously vary contingently depending on the status quo from which transition starts. Therefore, they introduce path dependency. These costs are not included as such in the analytic framework of Hagedorn, which therefore takes a static view. In the empirical case study following below we point towards costs of institutional change such as costs of implementation of e.g. altered formal property rights/ governance structures.

was employed to look at goods and services evolving from the ‘carrier function’ of ecosystems/landscapes. For applying the IoS framework to the multifunctionality of an overall landscape it has to be taken stock of how various functions of the ecosystem perform in the empirical situation of the case study. The features of the transactions, actors, property rights regimes and governance structures that impinge upon them have to be identified. It is not hard to imagine that the degree of complexity of such an analysis is enormous. Therefore, the subsequent case study focuses only on the principal changes in functions and transactions that have been identified as shaping landscape and determining its multifunctionality. The description of the case is to provide for sufficient depth to draw out what the main determinants of institutional change were in the case study. Subsequently, this application of the IoS framework makes it possible to reflect on it. The underlying question of this analysis is if the IoS framework provides for the adequate categories to explain changes of the multifunctionality of landscapes in the case study region. Moreover, it provides insights on how the framework could be improved for analysing the complexity of elements producing landscape functionality.

For the case study a comparison will be drawn between the functions of the landscape in a sub-zone of the Algarve at two points in time (beginning of the seventies and the present). The author is unable to give an absolute assessment of landscape functions. Instead, the relative changes of landscape functions in between the two moments in time will be described. Furthermore, the author can obviously not assess the performance of all landscape functions equally well. Specifically, the production function did hardly disclose itself due to lack of data in this field. For the description of functions the study was bound by the limitations of the knowledge available in the public domain. The relative changes of landscape functions are described in a qualitative fashion; they are not valued, as often undertaken in function analysis (see for example, De Groot 2004; Costanza et al. 1997; Vanslebrouck and Van Huylenbroeck 2003) which is similarly open for subjectivity and uncertainty (see for example Martinez Allier and Munda 1999 on the issue of incommensurability of values). The author tries to overcome the lack of data by choosing a single case study approach in which a deep understanding was reached through extensive fieldwork which is documented in a related doctoral thesis (Thiel 2005). It relied on a large number of interviews with all relevant sectoral actors at the various levels of governance, and a literature and document review covering the whole period of time studied. Among other reasons the case study region was selected as specifically drastic changes in multifunctionality could be observed here (ibid. 2005).

The author chooses to compare today's (2005) landscape functionality with that in the beginning of the seventies as this was the starting point of the 'Europeanisation' of Portugal. The case study region comprises two neighbouring councils, Silves and Albufeira in the Algarve. Silves has at least three times the size of Albufeira. Most of its territory is in the interior of the region; it has a very short coastline. Albufeira has a relatively long coastline with little reach into the interior<sup>14</sup>.



**Figure 3: Councils of the Algarve**

Source: CCDR Algarve (2005).



**Figure 4: Morphological Regions**

Source: MAOT (2000).

<sup>14</sup> The three morphological zones of the region are represented in the case study region: the coastal 'litoral', a flat strip along the coast, the intermediate Barrocal, a hilly and fertile zone parallel to the coastline and the interior Serra, a mountainous inaccessible and rocky stretch, equally parallel to the coastline. Climate in the Algarve is a bit milder than in the Mediterranean. Precipitation has great inter- and intra-annual variation. In the case study region there are few relatively insignificant streams that sometimes dry out in the summer, and some coastal, relatively small aquifers. In the interior both councils have access to a very large aquifer with a considerable rate of recharge.

Below, an integrated view of the interactions between the various landscape functions is provided. In a second step it will be attempted to explain this account of landscape function changes by means of the IoS framework. Therefore, the changes in the principal transactions with the ecosystem will be identified and described, followed by a description of the changes concerning actors, property rights and governance structures. The case is presented in a way to provide for sufficient in-depth analysis and explanation to understand the principal institutional changes involved and their significance. Such a strategy claims to leave out more micro explanations legitimately (Scharpf 2000: 83).

### **3.1 Development of the ‘Multifunctionality’ of the Case Study Region**

Without doubt the carrier function of the landscape grew immensely in significance in the councils of Silves and Albufeira. Transportation infrastructures, tourism facilities and habitation multiplied. Agricultural production on the whole decreased significantly, with only few types of localised production remaining. Moreover, today the landscape takes on carrier functions in a spatially more segmented and locally concentrated, intense fashion than in the beginning of the seventies. Tourism and its facilities are concentrated along the coast and its direct hinterland. Infrastructures and specifically transportation infrastructures are also located in the hinterland of the coastline. Habitation concentrates similarly on the coastline which it did not do before, or around the urbanised areas in the Barrocal. Agriculture is confined to the most suitable areas in the Barrocal which have access to water supply and which are not demanded by the tourism sector. Where agricultural activities continue they have been intensified over time through the use of irrigation, fertilizers and pesticides. Furthermore, in the Serra, surface water supply infrastructures are constructed to cater for the water needs of the tourism sector.

These changes in the carrier function had detrimental effects on the other functions of the landscape: The information function deteriorated due to a disfiguration of the coastal zones and its hinterland and the decrease and changes in agricultural activities. The localised regulative and production function deteriorated due to increasing overexploitation of underground water resources and erosion in the coastal zones as well as in the Serra. The habitat function was sidelined as tourism development on the coast became predominant not leaving much space for anything else. In the interior specifically large surface water supply infrastructures as well as transport infrastructures endanger the survival of rare fauna and



flora. The habitat function is becoming confined to specific locations. Their maintenance is the outcome of increasing management efforts.

With regard to the normative multifunctionality criteria introduced by Wiggering (1997, see also section 2.1) the following can be concluded: Based on the broad assessment described long-term conservation of biotic, abiotic and cultural resources and social perspectives of the rural populations have deteriorated. On the other hand, overall monetary welfare that is generated in the region and standard of living have improved together with the economic well being of the landowners. How economic well being will develop in the long run is difficult to say, not least as already for several years the economic performance of the region deteriorated slightly. Looking back this harsh trade-off was probably not necessary. Other promising strategies generating similar welfare benefits were envisaged at several points in time<sup>15</sup>. Chances are that they would have been less detrimental for functions other than the carrier function<sup>16</sup>. Below we look at the dynamic development of the case study region wondering if the specific configuration of interacting and co-determining transactions and activities that shape overall multifunctionality of the landscape can be made responsible for this outcome and how we need to analyse the institutional configuration governing it.

In the following focus is laid upon four activities whose development dominated landscape change in the case study region: (1) construction and land use associated with tourism, (2) construction of infrastructures (of supra local significance), (3) habitat development, and, (4) agricultural development. The case study will be described through the IoS framework lens starting out with the explanandum, transactions; followed by the development of formal property rights, the changes in the governance structure and the features of actors in relation to the explanandum. This sequence is considered to provide the most accessible analytical presentation of the case study. The IoS framework does not in itself prescribe a specific sequence in which the presentation of the explanandum has to be structured.

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<sup>15</sup> In fact, changes in property rights and governance structures regarding land and aquifer use in the mid eighties and in the beginning of the nineties were to constrain both so that a greater number of functions could have co-existed (see also below).

<sup>16</sup> This judgement obviously varies in correspondence to the scale at which landscape functions are judged. However, while this judgement has been reached on the basis of in depth fieldwork leading to a good level of qualitative understanding of the region and its development. A cleaner methodology consisting of indicator, scale, threshold definition and the treatment of valuation issues has not been applied. However, while such a methodology is surely more transparent and intersubjective, it would remain subjective on a different level and sideline other important issues.

### 3.1.1 Transactions

Transactions, as defined here, produce environmental problems or benefits which impinge on the property rights of others than those producing them. Their properties in relation to the period studied are stable. In the case study region the activities tourism, infrastructure construction, habitat development and agricultural development imply the following environmental problems/benefits or *transactions*: (a) *deterioration of aquifers due to over-abstraction* originating from intense agricultural practices, golf course and green spaces maintenance and abstraction for consumption by individual tourists; (b) *pollution of aquifers* originates from agricultural development and maintenance of golf courses; (c) *sealing of soil and disfiguration of the landscape* originating from tourism - habitation and infrastructure construction of supra-local significance (here, in an exemplary fashion, infrastructures aimed at surface water provision are dealt with); (d) *spatial decrease of habitats* originating from tourism, habitation, infrastructure development and golf course construction; (e) *maintenance of habitats* as a result of nature conservation activities. Below, the properties of these transactions are characterised:

Pollution of and abstraction from aquifers (a, b) can be dealt with jointly. It is technically difficult to exclude from them, while these activities harm others that also have access to the aquifers (rivalry). Specific assets can only be capitalised in a specific location (site and capital specificity) and, in the case of agricultural practices, through specific growing practices (knowledge specificity). The environmental problem of pollution of aquifers is inseparably produced and depends on the production method (agricultural practices/golf course maintenance). In the case of exploitation of aquifers by farmers and tourism enterprises jointness (inseparability) is not necessary as alternatively surface water sources could be used which may often not be considered to be viable and which create other environmental problems. In the case of abstraction of surface water excludability as well as asset specificity in terms of location specific investment are much higher. Pollution and overexploitation of aquifers are frequent, localised and small-scale transactions in the case study region. The problems that occur are furthermore complex, uncertain and heterogeneous in their interaction with the localised ecosystem and overall environmental conditions.

The information function of the landscape is affected by the disfiguration of the landscape (c). This environmental problem is a pure public good (bad), which is jointly produced with the installation of habitation, infrastructures, tourism facilities and golf courses. The investments associated are site-specific, occasional and have long-term-implications. Across

the overall region or case study zone a considerable number of similar features occur. Their impact on the landscape is not complex but highly subjective.

The sealing of the soil (c) creates an impure public bad. The groups affected are determined through spatial and landscape conditions. Excluding someone from its effects is very costly. It is an inseparable product of infrequent infrastructure and habitation development which imply great asset and site specificity. The emerging environmental bad has complex unpredictable consequences that are worsening in a cumulative fashion.

The environmental problem of the spatial decrease of the habitat (d) or its counterpart habitat maintenance (e) is a pure public good that has complex uncertain implications that are site specific. It emerges due to site specific transactions which are infrequent in relation to one site but accumulate due to the extent of overall activities increasing sealing of land.

### *3.1.2 Property Rights*

Property rights changed with regard to the different activities that cause environmental problems/benefits that the case study touches upon. Principally, property rights changes have been constrained through licensing and planning procedures. The development of property rights of the following categories of activities needs to be distinguished: (a) aquifer pollution and abstraction-related property rights, (b) private land use related property rights, (c) public land use (infrastructure) related property rights and (d) property rights in nature conservation areas. In the following, a very schematic description of property rights regimes in the beginning of the seventies and presently is provided:

Aquifers in Portugal have always been and still are private property of the owner of the land above them. In the seventies no constraints existed on freely abstracting from or polluting aquifers. Today - and already since the beginning of the eighties in the Algarve - abstraction from aquifers has to be licensed with regards to quantity and conditions. Conditions imposed on water licenses are orientated by the regional and national water plans. Diffuse pollution of agriculture is unconstrained until today and diffuse pollution from golf course maintenance is only recently indirectly constrained. Golf course operators are to follow good irrigation practices minimising use of fertilizers and pesticides. Since the end of the nineties farmers obtain additional payments from the state if they adhere to good farming practices. Since the mid nineties agriculture and all other users are to be charged for water abstracted from aquifers. Surface waters are public property and only the state can determine who draws water from it.

In the beginning of the seventies as well as today land ownership entitles for construction. Formerly, it was subject to a building licence passed by the local authority on a discretionary basis following basic fire regulations. They were to formally constrain property rights of individuals. Since the beginning of the nineties licenses passed by the local authorities have to be in line with local and regional planning documents which are approved by the central state. They constrain property rights by specifying land use. In specific situations the central state can authorize construction independent from the valid plans. The landowner has to pay to the local authority for the license in relation to characteristics of the construction (size, commercial use or not). Furthermore, depending on the type of project it may have to undergo an Environmental Impact Assessment (EIA) which may result in requirements further conditioning property rights.

In the beginning of the seventies the state did not have any constraints on developing infrastructures on its land. Presently, it may only do this in areas where the regional and local planning documents indicate the corresponding use classification for the land unless it grants an exception itself for reasons of national welfare. Furthermore, depending on the type of project it may be subject to scrutiny and alteration throughout an EIA. Construction is entirely prohibited in national agricultural reserves and national ecological reserves (nature conservation). Some of the latter reserves additionally have the status of Natura 2000 imposing restrictive rules for project development.

### *3.1.3 Governance Structures*

Governance structures supervise and sanction property rights to specific components of nature or organise transactions. Governance structures relate to the various categories of property rights at issue with regard to environmental implications in the case study.

Broadly speaking, in the beginning of the seventies structures sanctioning and supervising property rights did not exist in the fields of aquifer pollution and exploitation, nature conservation areas, and public land use for infrastructure development. Private land use for construction was subject to a hierarchical governance structure, where local authorities determined land use features. They did this in a horizontally uncoordinated fashion.

In the meantime, governance structures emerged for the various property rights regimes in place. Hierarchies are dominating relations between the public sector and private entities/actors. The exploitation of aquifers by farmers and tourism enterprises is subject to such a hierarchical regime, as well as private land use. Property rights are to follow programmes and plans in relation to water and land use adopted at the regional and national

level. They are to embed licensing practices in an overall strategy. These overall strategies have been subject to ‘weak’ horizontal coordination mechanisms with sectoral strategies impinging on the same issue<sup>17</sup>.

The exercise of property rights in the case of agri-environmental measures is subject to a hybrid form where the performance of farmers in terms of aquifer pollution and abstraction is monitored and evaluated and financial incentives are given for adherence to good agricultural practices implying learning and innovation.

Where an EIA has to be applied to a certain type of project the hierarchical granting of development licenses is complemented by a hybrid arrangement of horizontal and vertical (communicative) non-market coordination between authorities and stakeholders. It is combined with knowledge and information acquisition for evaluating and monitoring environmental performance. In case a project is co-funded by the European Commission additional informal governance structures (e.g. channel of knowledge and information exchange, learning and sometimes even informal conflict resolution) are enacted between stakeholders concerned and the European level.

In instances of conflict between the regional agricultural administration funding aquifer exploitation and the regional environmental and water authority controlling the exploitation of aquifers adhoc horizontal non-market communicative coordination emerged for resolving the pertinent conflicts. Similarly, horizontal non-market coordination mechanisms with the aim of conflict resolution are applied to strategic planning exercises of outstanding regional significance.

#### 3.1.4 *Actors*

The IoS framework looks at the varying actors in relation to the transactions and underlying activities that cause the environmental problem/benefit. Therefore, actors need to be distinguished with regard to transactions as well as activities. Actors will be described in a cursory fashion and grouped by activity. Specifically, it will be pointed towards changes in their characteristics over time. The attitude of actors towards the normative legitimacy of their actions is included.

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<sup>17</sup> That is, consultation and participation, yet no cross-sectoral evaluation or studies. Several plans were looked at, e.g., irrigation plans, land use development plans, economic development plans, and water use development plans.

## Agriculture

In the beginning of the seventies farmers operate largely independent from public sector intervention. They are partly responsible for the environmental problem of pollution and over-exploitation of aquifers. Much farming was done for subsistence purposes bound by the limited resources of the farmers. Many farmers were analphabets, organisations or associations of farmers did not exist; and both had little influence on policies. Cultivating the land has a long tradition and the relation to the soil was significant for the identity and value set of farmers and their communities. Farming was not seen only as an entrepreneurial profit oriented activity. Sensitivity to environmental problems was and still is low. Their transactions are generally viewed as legitimate.

Presently, a very limited number of the overall reduced number of farmers take an entrepreneurial approach. Some are educated in universities resulting in improved farming techniques; there are also regional development and education programmes run by the regional agricultural authority. Frequently old people farm for subsistence purposes. Political influence and degree of organisation and cooperation is still very limited and public sector driven.

The regional agricultural authority principally aims at educating and improving farming practices for achieving rationalisation and modernisation. It funds education and infrastructure projects and that way continues to pursue the development of competitive intense irrigation agriculture in the Algarve. Most funds origin from the European Common Agricultural Policy mediated by the central state. Accordingly, the regional authority follows the European regulations where necessary. Spending funds is another paramount objective of the regional authorities. It operates entirely separate from other regional authorities and entered into disputes with environmental and water authorities several times. Its political weight is low. Farmers and the regional agricultural authority founded associations to self-control their agri-environmental measures in return for funding.

The regional environmental and water authority, which licenses the use of aquifers, has insufficient human, financial, and knowledge resources to actually do so. This has been improved only very recently. Problems associated with the pollution of aquifers are only recently recognised by bureaucrats. Control and enforcement of regulations has little tradition.

Formally, regional, national and supranational environmental authorities considered it illegitimate if farmers and the agriculture administration did not consider implications of pollution and abstraction. Abstraction needs to be formally licensed and controlled. In reality

farmers and the regional and national agricultural administration are indifferent to these environmental implications. Subsequent conflicts among sectoral public entities are resolved informally through political negotiations. Environmental NGOs (Non-Governmental Organisations) and agri-environmental associations consider overexploitation and over-use of fertilizers and pesticides illegitimate.

#### Operation of Golf Courses

In the beginning of the seventies golf courses did not exist. Presently, tourists (indirectly), tourism enterprises, and the regional environmental and water authority are involved into shaping the associated environmental problems. Algarvian tourism enterprises and policy makers view golf courses and so called quality tourism as strategy for improving the Algarve's reputation as destination for tourists and promising income source. Before, it had been known only for mass tourism. Now, golf- and wealthy tourists were to be attracted which requires aesthetic attractiveness of the surroundings of these holidaymakers. To maintain almost northern European golf and park landscapes large quantities of water, fertilizers and pesticides are needed in Southern European climatic conditions. Many tourists choosing the Algarve are probably not aware of the environmental implications of this type of landscape management. Their concerns with regard to the quality of the region are different ones. According to Algarvian tourism enterprises and public actors an environmentally friendly image of golf courses seems to matter for the choice of destination only lately (Thiel 2005: 182ff., 240ff.).

Until recently, also Algarvian entrepreneurs and policy makers can be considered unaware of the environmental implications of this strategy. Various Algarvian actors had associated themselves throughout the nineties for achieving effective influence on policy making. Since then they effectively pushed for further water supply, tourism development, infrastructures and tolerance towards the environmental implications. They constructed the vision of the economic future of the Algarve as one of quality tourism.

The regional environmental authority has the authority and resources to evaluate golf course projects in terms of their environmental implications. It imposed and enforced significant conditions on recent golf course developments. Very rarely it refused a license or inhibited it through the EIA process. Increasingly it promotes good practices for the irrigation of golf courses. As long as golf course operators comply the regional environmental authority considers their transactions as legitimate. Throughout the nineties central state authorities overruled regional planning legislation several times and granted permission to construct golf

courses. This showed the political clout of the tourism sector and economic objectives of the central administration/government. Environmental NGOs consider several golf course projects as illegitimate. They insist on their contradiction against formal norms (water licensing and pricing) and regional water scarcity.

#### Tourism - Habitation Development

In the beginning of the seventies northern European tourists (indirectly), tourism enterprises, building companies, local and national authorities were involved into the development of accommodation for tourists and second home-owners in the Algarve. Portuguese investors and entrepreneurs provided financial resources which fuelled uncontrolled tourism development. Local authorities aimed for short-term economic gain. The associated construction was viewed as legitimate.

Recently, tourists have become either more demanding with regard to the quality of their accommodation or less willing to pay. Consequently higher standard accommodation as well as cheap package holidaying developed. At the same time demand for second homes increased significantly from within Portugal and the rest of Europe due to changing lifestyles and increasing wealth. Since the start of tourism development an economically significant construction sector has developed in the Algarve. Today Portuguese and international tourism enterprises and operators are complemented by real estate agencies. All of them are predominantly interested in short-term economic benefit and do not consider implications for environmental conservation (Thiel 2005: 241f.). They are well organised and effective in transmitting their agenda. Policy makers guiding public authorities tend to accommodate their preferences. Communicative links between public authorities and the economic sector are well established influencing opinion making. Furthermore, for their budgets local authorities depend financially on local construction tax and therefore, on an expanding tourism sector. Similarly, the national budget depends on prospering tourism. Tourism is one of the largest export sectors of the country with the perceived best strategic outlook.

Local authorities have to license local tourism construction. Nonetheless, in many instances construction took place where it was not supposed to. Corruption or favouritism are provided as reasons. The same is alluded to with regard to instances where the national authority overruled plans due to paramount “national interest”. Furthermore, above-mentioned resource constraints made the regional water authority ineffective in controlling water related transactions. For specific tourism projects (e.g. large accommodation projects,



golf courses and marinas<sup>18</sup>) an EIA has to be approved by an evaluation commission dominated by regional and national sectoral public authorities. Only lately these commissions have become more critical of the projects they evaluate.

Many local, regional and national actors that do not have a direct stake in tourism development (specific public authorities and the tourism sector) meet the transactions involved in it with the general suspicion of illegitimacy in formal and informal terms. Legislation and licenses or monitoring and enforcement authorities are under the general suspicion of tolerating or promoting illegitimate construction. With regard to construction a specific problem is that a significant amount of licenses that has been granted before the introduction of the land use-planning regime, in 1992, continues to be valid until today.

### Infrastructure Construction

Actors involved in infrastructure construction are considered in an exemplary fashion looking at surface water exploitation infrastructures (dams, pipes, treatment plants). In the beginning of the seventies what is now referred to as national aristocracy of water project developers (i.e. construction companies, the national water authority, the ministry consultancies agricultural authorities) jointly promoted surface water infrastructures. They considered it automatically economically viable and the only way to secure economic development. Water quality problems and ecosystemic problems were not considered. Also, little knowledge existed in their respect in comparison to the engineering expertise to develop surface water infrastructures. For financial resources they relied on public funds.

From the eighties onwards international funding bodies became involved in funding and examining environmental implications of infrastructures. The 'clients' of these infrastructures, the tourism sector, local authorities and agriculture were unorganised at the time but they were urgently demanding for the realisation of further surface water supply infrastructure. Grand surface water infrastructure projects were accepted and communicated as only way to secure long-term economic survival. They were generally viewed as legitimate.

Presently, the 'client' sectors of these infrastructure projects maintain the same attitude. As such projects necessitate an EIA the various sectoral regional and national public administrations and stakeholders have the opportunity to express their opinions on it. The

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<sup>18</sup> Golf courses and marinas have been excluded from EIAs until 1998 under Portuguese legislation. This legislation always breached the EU Directive for EIAs.

only actors opposing are the national environmental NGOs. However, they do not have the resources to contribute convincing knowledge to alter the decisions taken. All studies were commissioned by the same public sector actors that favoured surface water supply infrastructure development.

Specifically the European Commission co-funds surface water supply infrastructure (dams, water treatment plants and distribution pipes). Consequently, its environmental directorate has to assess its compatibility with European environmental regulations. It has resources to produce data for this purpose. It can inhibit co-funding as well as it can inhibit construction where regulations are not complied with. Driven by the environmental NGOs they evaluate the environmental implications of a specific dam project in the case study region (Odelouca dam) in-depth. However, due to good informal relations of the regional and national actors to the European Commission the latter does not declare the project illegal although it withdraws its financial contribution. The national project owners, in turn, use their authoritative and financial resources backed up by the majority of the population and press ahead with the construction of the dam in what has meanwhile been declared a Natura 2000 area.

#### Nature Conservation

Nature conservation activities did not exist explicitly in the region in the beginning of the seventies. Today, it is principally a matter of land use. The question is what types of land use may occur in specific kinds of nature conservation areas. The national environmental authorities designate nature conservation areas, and regional environmental authorities make sure they are complied with. In case an area has the status of a Natura 2000 site a project has to be of national interest to be licensed. The public authorities have capacities to attain knowledge about project implications and they can steer the final judgment of the evidence in the EIA through nominating the evaluation commission. Environmental NGOs are the principal defendants of nature conservation areas. On the other hand, many regional actors, such as farmers, local authorities and tourism developers view this type of transaction (nature conservation) as illegitimate in informal terms. They defend the normative view of the paramount role of land ownership with which the state should not interfere and argue for the need for economic development which nature conservation should not inhibit.

## 4 The IoS Framework and Evaluation of the Case Study

In the first half of the nineties the case study region was subject to changes in property rights and governance structures specifically in relation to aquifers, land use, public infrastructure projects and nature conservation as specific form of land use. Hierarchical licensing regimes guided by strategic planning documents were introduced. They aimed to steer land use development in the case study region into a more sustainable (multifunctional) path constraining and guiding construction and tourism development as well as aquifer pollution and limiting the overexploitation of aquifers. They have been introduced in a top down fashion. Many of them transposed European Directives. Some of them had their origin before Portuguese membership in the EU. On the national and regional level transposition and implementation efforts were characterised by considerable inertia.

Using the IoS framework we can single out five factors explaining the lack of enforcement of the licensing regime constraining water abstraction: (1) the costs of enforcement increase as regulations become tighter and even further as the frequency of transactions increases (2) the resources of the entities responsible for enforcement are very limited, (3) the normative values of farmers as well as local authorities and tourism enterprises support abstraction without licensing. (4) Lack of understanding for its environmental implications, even inside of the enforcement authority and the traditional normative and belief system supports this. Finally, (5) contributing to the environmental problem is the lack of horizontal coordination mechanisms between the environmental authority controlling abstraction and the agricultural administration supporting it in an almost uncontrolled fashion. The long-term implications are complex and uncertain, and knowledge about them hardly exists.

With regard to the failure of the construction licensing regime to constrain building activities the following elements explain the environmental damage according to the IoS framework: it is the aim of the constrained (tourism developers) as well as the constraining actors (local and national public authorities) to promote construction as both gain a short term profit which suits their goals and profit orientation. Furthermore, it suits their normative evaluation of the entitlements land ownership provides. Also, costs of implementing the construction licenses regime are high. Additionally, transactions increase in frequency as more construction takes place, and the implications of building and their cumulative effects are complex and uncertain. Knowledge about them only starts to emerge.

Habitats are decreased in size as existing normative values of all actors with political and financial resources pay no respect to them. Furthermore, value orientations of these actors

prescribe short term profit maximising while the benefits of habitat conservation are complex and uncertain. The only actors defending habitats, the environmental NGOs, have no resources to provide knowledge about its implications, to influence political processes significantly and to physically preserve habitats themselves.

Changes in (formal) property rights can be summarized as follows: Property rights changes introduced in the case study region can only be enforced if the actor enforcing them disposes of the necessary resources. However, in the case study region implementation costs are beyond the available means of the authorities. Furthermore, the specific relation of norms and modes of valuation of constrained and constraining actors in hierarchical relationships is significant. Their similarity and contradiction to formal rules in the case study region lead to the ineffectiveness of the formal property rights regime. Therefore, in the case study region actor features (financial and political resources, norms and orientations), costs of implementation, rise in transactions costs due to a rise in number of transactions, and their complex, uncertain implications were decisive for the ineffectiveness of the changes in property rights. Below, it is furthermore referred to the role of contextual features.

It can be concluded that the landscape in the Algarve developed not as sustainable as it possibly could have, specifically in environmental terms. The IoS framework helps to explain what role the institutional configuration of property rights, governance structures, and actors play in relation to transactions. In the following the question is dealt with if the IoS framework provides the adequate conceptual toolkit for reconstructing and explaining the effects of socio-ecological interactions on the multifunctionality of landscapes in the case study.

Despite some complementary suggestions, which will be elaborated in the following section, the IoS framework provides a valuable contribution to the explanation of the role of the institutional configuration for socio-ecological interactions shaping multifunctionality. Being an elaborated analytical framework it proved useful for the analysis of the institutional setting governing multifunctional landscapes. Transactions shaping multifunctional landscapes could be perceived to be more complex than those shaping agri-environmental problems. Therefore, the object of study may have been too complex to apply the IoS framework to its empirical study. However, this fear could not be confirmed. While the framework necessitates in-depth data collection and understanding of the institutional configuration, the categories it proposes provide a comprehensive and adequate explanation of the outcome of their interaction. A similar assessment of the framework is

suggested in the application of the framework to agri-environmental practices as undertaken by other authors (Rauchenecker 2003; Schleyer 2004).

## **5 Lessons: Taking the IoS Framework Further in the Context of Multifunctionality**

Two aspects of the application of the framework seem to specifically merit changes: firstly, it does not preview the distinction between formal and informal property rights and governance structures. However, this distinction can clearly be made in the case study. On the other hand the framework provides the actor and transaction related categories to adequately explain the co-existence of formal and informal property rights and governance structures. Contextual factors are important here. Secondly, the framework overdetermines the emerging multifunctionality of the landscape in the case study region. In other words, it cannot be clearly distinguished if transactions, property rights, actor, governance structure or even context related features were decisive for the emergent Algarvian landscape. Somewhat vaguely it has to be assumed that the specifically negative performance of the Algarvian landscape in terms of multifunctionality is the result of these contingently overlapping factors characterising a 'specifically unsustainable' institutional configuration. This analytical problem can only be overcome by comparative case studies where single categories vary. In fact, from own experience, the author would argue that such co-determining and mutually reinforcing dynamics are frequently discovered when an in-depth understanding of case studies is achieved. To some extent this again hints at the possible existence of common underlying causes, which were not uncovered by the analytical framework used. However, due to the almost ever-present dialectical interrelations of cause and effect in social science research often singling out one underlying cause does not represent much more than a conceptual preference of the analyst.

Nonetheless, contextual factors seem to be undervalued in the framework. This becomes specifically clear when the framework is applied to multifunctional landscapes as they are shaped by multiple connected and interdependent transactions. Therefore, here the need is reinforced to conceptualise and detail the relation between contextual factors and the IoS framework configuration (see also Ostrom 2005, chapter 9).

A significant problem is how to delimit the context of the IoS framework. The delimitation of context depends on the transaction looked at and the contingent institutions involved in it. Therefore, it covers the transactions and institutional configurations and actors that are not

directly related to a specific transaction but that are of great relevance to their analysis. Delimitating context this way gives it an outstanding importance for a synthesised understanding of what shapes multifunctionality of landscapes. There might be few or only one contextual factor that explains the institutional performance across the IoS configurations governing various interdependent transactions due to interdependent environmental problems. Due to its interdependent effects this could be of specific interest for the analysis of institutional performance in regard to landscapes. Hereby, specific attention should be paid to commonalities between factors influencing improper implementation of formal property rights across various transactions. Such common factors could explain cross-transaction institutional performance in a specific setting. Knowledge about them would be specifically valuable for initiating institutional re-configuration through designing or crafting potentially more adequate institutions.

For example, one significant contextual factor in the case study responsible for aggravating environmental problems is the insufficient performance of the institutional configuration that is reinforced across a number of transactions. It is not specific to one transaction, therefore it pertains to significant contextual factors which explain performance and which are of specific relevance to the case of multifunctionality of landscapes. Overexploitation of aquifers is promoted by the fact that property rights for land use are not adequately implemented, which further aggravates the cumulative problem emerging from failure of the water control regime to work. Moreover, land use development in terms of tourism habitation is equally supported by infrastructure development accommodating it. Infrastructure development, in turn, is facilitated by the ineffective constraints on property rights through EIA and the lenient enforcement of special protection areas.

The described configuration resembles a system of loops mutually reinforcing environmental problems within and across a variety of functions. The interconnection is given by the mutual interdependence of the transactions<sup>19</sup>. Such interdependence of institutional configurations as well as the mentioned accumulation effects should be taken into account in the analysis of institutions governing multifunctional landscapes. The dominant or subdued relationship of one transaction to the other or one institutional configuration over the other should be characterised. The outcome of such an analysis may be that the underlying cause of the performance of one institutional configuration is the institutional configuration governing

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<sup>19</sup> E.g., tourism development implies the exploitation of water, the construction of habitation, the decrease in habitats, and the provision of certain transport infrastructures and facilities.

another connected transaction. This category (1) *interdependence of institutional configurations due to interconnected transactions* and the relative ranking of institutions describes the case specific context of transactions in which institutions operate and the likelihood of the emergence of environmental problems/benefits. These interdependent transactions could even be ranked according to the significance of institutional performance and in relation to normative values or logical interlinkages.

To illustrate this with the case study: property of land legitimates disposing of it at will, therefore, even formally illegitimate construction for tourism is undertaken and accepted. Once accommodation is developed normative values prescribe that water supply is to follow which implies further exploitation of aquifers. Therefore, unrestrained disposition of land property due to the related institutional configuration and values of actors is at the heart of the unsustainable development land use, decrease of habitats as well as water exploitation deteriorating a variety of land use functions (information, production, regulative function). The institutional performance in terms of land management is therefore more significant than that governing the abstraction of aquifers for understanding the unsustainable development of the case study region in terms of multifunctionality. Such contextual information regarding the (2) *significance of institutional configurations* can specifically inform institutional design efforts.

The comparison of the configuration of institutions governing interconnected socio-ecologic transactions (in terms of factors outlined by the IoS framework) shows the following similarities: (a) lack of resources of public authorities to enforce formal property rights, (b) uncertainty due to lack of knowledge and complexity of environmental problems, (c) similarity of normative evaluation and mode of calculation of those constraining property rights, and (d) all politically significant actors and those constrained (short term profit orientation by all actors significant for transactions and little valuation of the environment). Case study evidence shows that this common evaluation is partly related to the predominant political economic significance of the tourism sector for economic development in the region (in terms of employment, economic welfare and national terms of trade). This contextual factor seems to be of paramount significance for understanding the unsustainable development of the landscape in the Algarve. It is complemented by the gap between formal property rights of actors, which are implemented in a top down fashion, and their actual property rights which are strongly embedded socially due to deeply rooted normative values actors hold. Furthermore, those constrained (entrepreneurs) have traditionally significant scope for political influence on those constraining (local and regional authorities). Overall

institutional reconfiguration has been launched in a top down fashion with the origin at the EU level. So far its effect on the existing informal institutions was limited.

Based on this example contextual factors are suggested that provide insights into underlying causes: (2) *political economic context* in regard to different transactions and, the discrepancy between enacted and formal property rights due to a disembedded re-shaping of formal property rights which is to re-shape the exercise of property rights on the ground which are culturally rooted and economically founded.

Specifically as part of function analysis for characterising the context it seems to be essential to analyse the overall societal attitude to the various functions of the landscape which may be influenced by the association of specific landscapes with people's identities. Societal attitude is assumed to be related to the political economic context and (3) *socially and culturally conditioned evaluations of transactions/ functions*. For the case of the Algarve there is little doubt that the Portuguese population, the tourism sector and the public sector valued short-term economic profit generated from the carrier function higher than the information, production, regulation and habitat function of the landscape. This is founded on an economic reality shaping politics as well as on deeply rooted attitudes to the legitimacy land ownership provides. However, looking closely at the evidence, the habitat function is recently considered to a larger extent specifically by the tourism and public sectors. It is perceived to yield heightened economic benefit in the future due to changes in tourism demand. Similarly, the regulation function is being considered to a greater extent as its deterioration threatened economic survival of the region. The lack and bad quality of drinking water for example as well as the pollution of coastal waters threatened the physical subsistence of the tourism industry as well as the image of the Algarve as tourism destination. Both are essential 'resources' the Algarvian tourism industry capitalizes on. Therefore, in the Algarve a changed perception of opportunities for profit lately changed economic demands and political priorities and therefore also socio-ecological transactions.

Further contextual factors that explain prevalent value sets and evaluative frameworks which are decisive for commonalities across institutional configurations concerning various transactions are (4) *agency features*. Independent from their position or role, agency or actors' specific attitudes are of vital importance for understanding the performance of the institutional configuration. A large degree of consistency of agency orientation in the Algarve among management and enforcement agencies originates from recruitment mechanisms. National ministers adopt a strong role in filling in key positions in the national and regional public sector. Centralised political leadership and competence therefore have an extraordinary role



due to relatively weak, politically dependent bureaucracies. Therefore *agency features* of political and sometimes administrative leadership are of great contextual significance as well as factors determining or “filtering” agency features influencing collective actors involved, such as recruitment or education.

Finally, (5) the need to take *institutional and physical time lags* into account has to be stressed for adequately applying the IoS framework and identifying what are normative Institutions of Sustainability and distinguishing them from ‘Institutions of (less or Un-) sustainability’. Hagedorn (2003, 2005) alludes to the significance of these issues as well. As noted above, the IoS framework describes a spatially and temporally contingent institutional configuration shaping socio-ecological transactions which produce the physical environment. However, for evaluating if an institutional configuration provides for sustainability the time lag of environmental problem manifestation has to be taken into account which emerges due to persistence of former institutional orders. Taking a dynamic view similarly physical time lags in environmental problem manifestation have to be considered. In the case study these issues are highlighted by the fact that many of the building licenses have been granted legitimately under the former institutional configuration before a hierarchical system of planning instruments was introduced. They continue to entitle for building - and thus, aggravating environmental problems - for years to come (institutional time lag). On the other hand in the case of aquifers the regeneration time of aquifers is very long, so that a new institutional order can only provide for better, more sustainable status and use of the aquifers in the long run (physical time lag). The application of the IoS framework to a dynamic development needs to take account of these intertemporal institutional and physical interdependencies and it needs to deal with them conceptually and methodologically. They are of great importance for adequately evaluating the performance of institutional configurations. As normative Institutions of Sustainability are contingent on a specific environmental problem the development trend of the activities and transactions governed should be characterised as well as the longevity of the environmental and coordination problem they produce. This dynamic view including time lags and comprising contextual and case specific information is of specific relevance for correctly judging the performance of institutional configurations governing socio-ecological interactions. Their consideration is essential for deriving normative Institutions of Sustainability.

Furthermore, similarly useful for extending the IoS framework towards a dynamic view is the introduction of the category of transition costs (costs of implementation of changes in property rights). Discrepancies between formal and informal rules may well be linked to high

transition costs which are not explicitly considered by Hagedorn as described above. Nonetheless, transition costs<sup>20</sup> characterising path dependency were of great importance for explaining the institutional performance and persistence of informal property rights in the case study.

## **6 Conclusions**

This paper combined De Groot's function analysis and Hagedorn's IoS framework for explaining how institutional configurations that govern socio-ecologic transactions produce and change (multifunctional) landscapes. The combination of these conceptual tools was applied to a subregion of the Algarve in Portugal. In view of the case study region it was subsequently focussed on the evaluation of the IoS framework for analysing institutions and their role in multifunctional landscapes. Summarising it, the IoS framework has proven valuable for analysing and explaining the way the institutional configuration shaped multifunctionality. Problematic is its lack to distinguish between formal and informal elements characterising institutions. Furthermore, unresolved is the fact that it overdetermines the physical outcome, so that clear cause and effect relationships cannot be established. The IoS framework acknowledges contextual factors, whose role is specifically stressed for reconstructing how the cross-transaction institutional configuration shapes multifunctionality of landscapes. In this regard several issues were pointed out which should be empirically described and conceptually further developed. Specifically, the conceptualisation of intertransaction and cross-institutional relations should be developed as well as the role of specific context variables, such as cross-jurisdictional agency features, agency selection processes (recruitment), political economic issues and a view of the relative societal valuation of landscape functions based on political economic and cultural setting should be introduced. Furthermore, introducing a dynamic perspective into the IoS framework and for adequately reflecting the performance of institutional configurations in relation to the physical environment specific attention should be paid to physical and institutional time lags between causes and effects of environmental problems and benefits as well as the notion of transition costs as conceptualised by Challen (2000).

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<sup>20</sup> Costs of institutional change which in the case study were equivalent to costs of implementation of formal property rights.

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