Is a UN Soil Convention feasible? A comparative analysis[1]

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Abstract

Recent calls for a UN Convention on Soils begs the question about its feasibility and advisability. International conventions are most likely to be successful where the need for action is compelling, the effects of inaction immediate, dramatic and relatively certain, and there are significant international spillovers. Potential signatories to a convention must believe they would benefit in some way, and that these benefits cannot be obtained if they abstained. We examine the characteristics of six UN conventions related to environmental issues and argue that an international soil convention would not satisfy these and other criteria, and would therefore be difficult to implement.

Key words: agriculture, soil, UN Conventions

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1 Introduction

Soils are an essential input into agricultural production. While there is concern about the ability of the world to supply sufficient food and feedstuffs in the future, soil health is a legitimate issue. Land degradation on a broad scale may lead to falling output, famine, rising commodity prices, and perhaps internal and international migration and civil strife. Given its global importance, some feel that there is a need for creating a focus on soil problems in public debate, amongst them the Danish National Association for Organic Agriculture (LØJ). This organisation commissioned this work to address the question whether pursuing a United Nations Convention to protect the health of soils is feasible and advisable.

In order to answer these questions, a number of aspects are addressed. First of all, a short overview of the present situation regarding co-ordination and co-operation on soil issues is provided in Section 2, where UN, national and private initiatives are discussed. In Section 3 a conceptual framework is presented as basis for assessing the likelihood of success of a soil convention, regarding both establishment and implementation. The success or otherwise of existing UN conventions is then explored in Section 4 on the basis of the framework used in the previous section.

2 Background

2.1 World, national and private initiatives

Several UN agencies have been involved with soil issues on a world scale. For example, in 1981 FAO adopted the World Soil Charter that established '...a set of principles for the optimum use of the world's land resources, for the improvement of their productivity, and for their conservation for future generations' (http://www.fao.org/docrep/t0389e/t0389e0b.htm). Other UN agencies worked with this issue, including the UN Environmental Programme (UNEP), which instituted the World Soils Policy (1982). Olembo (1983) set out procedures for preparing national policy with a sustainable land use theme.

The UN General Assembly, in its Resolution 44/228 of 1989, tried to move the world towards the goal of sustainable development by referring certain issues to the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992. This conference approved Agenda 21, which advocated, amongst others, actions that '…recognise the impacts of human behaviours on the environment and on the sustainability of systems of production'.[4] Several UN Conventions emanating from this Conference have a bearing on soils. However, none of them relate directly to soils *per se*.

Other soil initiatives and supporting services have been initiated or developed over the last decade, such as:

- the Soil Fertility Initiative, between FAO and the World Bank;[5]
- information systems, such as the Global Assessment of Soil Degradation (GLASOD) are maintained and used by UN organisations[6];
- the World Soils and Terrain Digital Database (SOTER) is a database set up to develop the national capability of soil research institutions to provide accurate, up-to-date geo-referenced soil and terrain information. This activity is carried out under the auspices of UNEP. FAO, ISRIC (International Soil Reference and Information Centre) and the IUSS (International Union of Soil Scientists) are involved in the evaluation of the implementation and the database;
- UNEP is presently in the process of reviewing its role in environmental land and soil issues, looking at existing legal and other instruments for national or sub-regional soil protection, and standardising or harmonising the land/soil cluster in the evaluation and reporting for national action plans under the existing conventions and multilateral environmental agreements. Currently, discussions on International Environmental Governance are taking place. In that context, UNEP is looking in detail into the land/soil related aspects of multilateral environmental agreements (MEAs) and their institutional framework with regard to scientific advisory bodies. UNEP is analysing the options for a more coherent and central assessment of land/soil related scientific assessment across MEAs. An example is the

[4] see: http://www.iclei.org/egpis/e-intl.html#1.1.8.

[5] see http://www.fao.org/tc/tci/sectors/africa.htm.

[6] see: http://www.gsf.de/UNEP/glasod.html.

International/ Intergovernmental Panel on Land and Soil as proposed at the UN Convention to Combat Desertification (UNCCD).

A number of national initiatives have been undertaken recently. For example, in early 2001, the EU brought out its new environmental policies in the form of the sixth Environmental Action Plan[7]. One of the policies is about 'Nature and bio-diversity'. It's objective is to 'protect and restore the functioning of natural systems and halt the loss of bio-diversity in the European Union and globally. To protect soils against erosion and pollution'.

In October 2001, the European Commission issued a draft Soil Protection Communication. It describes that, at present, the soil protection mechanism in the EU is via the Common Agricultural Policy through, for example, policies covering farm management systems (such as Good Farming Practice) or specific measures (such as no-tillage). In addition, other policies, including regional, environmental, research and transport, affect soil protection issues. The Communication concludes that, at present, a '…Community integrated approach to soil protection does not exist' (European Commission 2001, p.21). However, it sees that it can play a role in '…the development of EU-wide soil information and monitoring systems, the adoption of soil related standards, the preparation of guidelines and awareness raising activities'. However, '…In line with the fundamentally local character of soil issues, Member States will remain the main responsible actors for planning, implementing and assessing soil protection policies in accordance with international and Community commitments' (p.22).

Other national efforts concerning soil have been made by a number of European countries. Germany has had a Soil Protection Plan since 1985 and has recently produced a Soil Protection Act. Denmark's main aim of soil protection is said to be prevention of groundwater contamination, and in The Netherlands the Dutch Soil Protection Act protects the soil's multi-functionality from human activities (Scottish Environment Protection Agency (SEPA) 2001). SEPA is in the process of finalising its soil quality report, in which it identifies the impacts on the soil of industry, agriculture, forestry and waste applications, and draws implications both for Scottish soil policies in general and for SEPA policies in particular. England (Department of the Environment, Transport and the

[7] see: http://www.tvlink.org/environment/en/home.htm.

Regions 2000), is in the process of developing key indicators '...to derive soil targets and to help communicate and evaluate the effects of our soil policies and programmes'.

In the later part of the 1990s, much of the non-UN attention on soil conservation issues has been channelled through non-government organisations, amongst which the Tutzing-Initiative has been prominent. From the mid-1990s, people connected with the Protestant Academy in Tutzing, Germany, worked towards a draft text for a convention. This was finalised in July 1998 and is available on http://www.soil-convention.org/english.htm.

In April 2000, the IUCN (World Conservation Union) endorsed the proposal to investigate the feasibility of a global convention for soil as a major project under its 2000-2004 quadrennial program.

Despite the various initiatives from the UN, national and private organisations, many would contend that too little has happened in the area of soil conservation. It is then concluded that governance at a high level such as a UN Convention on Soil is in order, as the Tutzing Initiative suggests for example. The question then arises what could be expected of such an organisation.

2.2 Setting the scene for a UN convention

In the past, environmental issues were seen as local problems and hence were dealt with locally. Communities could devote their resources to improving the quality of their water, air or traffic flows as they saw fit. In recent times, there has been an increasing awareness that many environmental problems extend beyond the community level and that actions in one location have regional, national, international or even global effects. Where the polluter in one location is affecting people in different regions or countries, there is a need for appropriate regulation and enforcement for the mutual benefit of all.

On a global scale, international environmental agreements (IEAs) are meant to do just that: provide global regulations such that the total global welfare is improved. Some of these agreements, such as the Montreal Protocol that limits ozone depletion, can be regarded as successful and others, although less obviously successful, have at least drawn attention to the problem. The apparent

success of Framework Convention on Climate Change (UNFCCC) has encouraged some to suggest that a United Nations Convention on soils could contribute to reversing the degradation in soils in many countries and contribute towards foods security and political stability.

Not all problems lend themselves to international solutions. The topic of this paper is to assess the suitability of an international environmental agreement for soils. Factors influencing the likelihood of success of a convention in general include, not necessarily in order of importance:

- persuasiveness of the objective, either by scientists and/or the public in general;
- immediacy of the problem and timing of effect;
- the degree of international externalities attached to the particular issue;
- matching costs and benefits: the extent and degree of sharing;
- complexity of the solutions;
- scientific basis;
- monitoring and compliance costs;
- the number of players necessary for a workable agreement.

In Section 3, we have analysed a prospective soil convention in the light of these characteristics. The features that are likely to contribute to the success or otherwise of a soil convention are shown in Table 1. In Section 4, other existing conventions and agreements are examined and conclusions drawn about the usefulness of the analysis according to the framework used in Section 3. The observations about those conventions are added to Table 1.

3 A UN Soil Convention

3.1 Compelling objective

There is an abundance of literature on problems with soil health written by scientists and lay people but, on a world scale, the public is generally not aware of the problems and the consequences. To date, soil problems haven't captured the imagination of the public as have other topics, such as climate change, ozone depletion or the extinction of whales or elephants. Although salinity and dust storms are visible enough, there is no perception of crisis amongst the public in most developed countries. Nor do events such as storms or floods occur frequently enough to be perceived as a permanent crisis.

3.2 Immediacy of the problem and timing of effect

At one level, soil problems are readily apparent and the causes (for example, overuse) well understood. In many cases, the effects are relatively immediate. Other problems are less obvious as many of the effects of soil management are only shown in time. Land is not used in a fixed proportion to output. Capital and labour can be substituted for land to generate a given level of output. This means land quality can be degraded while output is maintained, thus making it difficult to observe land degradation in its early stages. Similarly, actions taken to ameliorate problems will also take time to show themselves.

3.3 International externalities

With soils, international trans-boundary effects are less clear-cut than in many other environmental issues. In general, there are few. One is the effect of floods, which can come down rivers that run through, and affect, several countries. Their intensity is related, amongst others, to land use and soil quality in countries upstream. Another example of international trans-boundary effects connected with land use is dust storms, which can and do transgress state boundaries. A third example, and a reason for international co-operation, is wars caused by frictions between people due to loss of resources, such as degraded soils and subsequent low food production. At the very minimum degraded soils threaten the independence of people, and increases the likelihood of needing assistance by others.

So, although in general soil quality in one country has no direct impact on conditions in another country, other less direct links connect countries. Firstly, there are connections between soils and climate change. Productive soils sequester more carbon, whereas desertification releases carbon into the atmosphere. This is why the issue of land clearing is so important in the climate change negotiations. There is also the notion that all environments are linked, and that what happens in one place affects the ecology of others. The third link is through trade. With open trade and countries competing with one another, one view is that a 'race to the bottom' ensues as countries lower their standards and overuse the soil to gain an edge on the international markets. Hence there is a role for international governments to set global environmental standards for the benefit of all. Otherwise,

degradation may ultimately lead to famine, forced migration and possible armed conflict, if that isn't occurring already.

In the case of resources that stay within national boundaries (such as land), it is generally assumed that it is national governments that have the ultimate responsibility. In many western countries, a large part of the land is owned by citizens of that country, such as farmers, and the power of deciding how to treat the land is often vested in them. Farmers in many countries are likely to resist controls on how they manage their farms.

These various linkages provide a justification for citizens in one country to feel concerned about the state of the soils in another, and lead to support for an internationally binding agreement. The soil generally has two characteristics that suggest the need for a role for a national government and possible international co-ordination. The role for government in controlling soil degradation arises because individual users of the soil (farmers) cause negative effects for other citizens at present or in the future. Many farmers may have little interest in what happens to the soil after they retire or die, and take the opportunity to overuse the asset until its value is much diminished. Farmers who are bordering on poverty are particularly prone to take a short-term view. A second feature relates to lack of knowledge. For example, farmers may not be aware that removing trees is likely to raise water levels and over time increase salinity in the whole catchment area. However, these issues can be addressed at a national level, as the benefits of such actions can be almost completely captured nationally.

In summary, the direct trans-boundary effects are minor, though the indirect effects may be considerable through their effect on, for example, climate change. Perhaps more importantly, the 'race-to-the-bottom' may be the biggest threat to the world's soil resources in an unregulated trading environment where the total cost of production (including externalities) can be ignored by producers and consumers.

3.4 Matching costs and benefits

If action in soil health is recommended it is presumed that expenditure on soil improvement will result in benefits that exceed costs (taken as all benefits and costs, not only the financial ones). The

intent of an international agreement would be to increase the productivity of land in the long run as compared with a situation without an agreement. Because the products resulting from this can be traded, the implications for a country of increased soil quality (both domestically and globally) depends on factors such as the proportion of the product exported (as lower prices due to an increased production would benefit consumers in other countries) and the responsiveness of consumers to changes in prices (which determines the size of the price changes). These factors determine whether domestic producers are better or worse off. There may also be benefits from improved soil quality that relate to factors other than sustainable output, such as bio-diversity. These are difficult to assess but real nonetheless.

A large part of the costs of soil degradation control measures are borne by agricultural producers, and these costs can be passed on to consumers. The costs of imposing legal impediments on, for example, certain agricultural practices, would differ not only between countries and regions but also within countries. This would make it likely that some regions/countries would change to other products, and possibly get out of agricultural production altogether. The direct costs would therefore not be shared equally, either between or within countries, as is the case with any policy change.

In other words, the commitments would impact differently on the various (regional) players, and without more details about the measures to be taken it is difficult to predict who captures the benefits, except to say that the benefits and costs are likely to be unevenly spread. This feature makes a convention less easy to negotiate. There is also little incentive for a country to join an international soil convention when, by instigating particular domestic soil policies, it can capture long-term benefits for domestic producers and consumers by unilateral action. However, this is only true in the long run. In the short run, the 'race-to-the-bottom' may disadvantage a country that takes national action in soil management.

3.5 Complexity of the solutions

The complexity of the solution to soil quality improvement is extreme, as there are so many factors (soil type, slope of the land, climate, to name but a few) which, with different kinds of land use,

determine soil health. It is also in this area of solutions where scientists will disagree remarkably about the way to proceed (see 'scientific basis' below).

3.6 Scientific basis

Many soil scientists agree that the soil quality is deteriorating in many countries – Soil Conservation Services are recognition of that fact. General solutions are known – such as retiring land from agriculture altogether, restricting certain practices such as land clearing, burning or over-grazing, or requiring some management techniques such as specific rotations or refraining from the use of certain kinds of inputs. However, there are also large areas of disagreement about it.

One example of disagreements is the technique of minimum or zero tillage. Reducing tillage is a means of improving soil organic matter and reducing compaction, an important indicator of soil health for some. Others claim minimum or zero tillage encourages, amongst others, monocultures while the use of a wider rotation system would be superior for the soil. There is no ready solution to these differences in opinion.

A second example is the effect of different farm management systems (organic and conventional) on the soil and it's ecosystems, with repercussions for crops and livestock production. Recent papers in which differences of effects are discussed include those presented at the bi-annual scientific conferences held by the International Federation of Organic Agriculture Movements (IFOAM), for example in Copenhagen in 1996 (Østergaard 1996; Kristensen and Hoegh-Jensen 1996). Abstracts of papers presented in Basel in 2000 can be found in Alfoeldi, Lockeretz and Niggli (2000). The debate about what those effects are and what it means for the sustainability of soil, production and environment has only just begun (see, for example, Avery 1995).

3.7 Monitoring and compliance costs

As it must be possible to measure whether the restrictions imposed by a prospective convention lead to progress, it is necessary to agree on a baseline of soil quality, criteria on which to base measurements of change and indicators with which to measure them. For example, should farmers be required to maintain a certain level of topsoil, or percentage of soil organic matter? Should they

be required to improve on the level at the time of the agreement - that is, what is the baseline? As soils and the effects of soil treatment are so variable even within a country – let alone the world – global standards, criteria and indicators seem meaningless. More details in the form of local standards, criteria and indicators, in order to cope with the variations in soil and its capacity to withstand negative effects of certain treatments, would make the use of indicators for monitoring purposes extremely expensive. The EC (2001) recognises this when it states that '…In line with the fundamentally local character of soil issues, Member States will remain the main responsible actors for planning, implementing and assessing soil protection policies …'.

A considerable effort has gone into developing indicators, or publicising work already undertaking in this area. In 1995, Pieri *et al*. produced a report on land quality indicators, which was co-published by the World Bank, FAO, UNDP (UN Development Programme), and UNEP. This work emanated from Agenda 21 of the UNCED Conference in Rio de Janeiro in 1992. Some years later, Dumanski, Gameda and Pieri (1998) published an annotated bibliography on indicators of land quality and sustainable management, which includes over 100 references, mainly from the second half of the 1990s. It also includes a number of websites. However, as mentioned, the unresolved issue is how to apply indicators globally.

3.8 Number of players

The number of participants in a soil convention need not be similar to that at the level of other conventions, such as the UN Framework Convention on Climate Change (UNFCCC) and the UN Convention on Biological Diversity (UNCBD). The last two relate to global problems requiring the co-operation of the bulk of countries to be effective. By contrast, a soil protocol between two countries could be effective in alleviating problems between those participating countries. However, if the aim of the international agreement is to alleviate/restore worldwide problems, then inclusion of many countries is desirable. The abandoning of the agreement of one party would cause few problems for the rest, in that they could still implement their policies. However, if the prevention of the 'race-to-the-bottom' is the aim, the withdrawal of each country can destabilise the resolve to find a solution.

3.9 Summary

In summary, the following picture emerges regarding the likelihood of instigating a soil convention that results in better quality soils. General deterioration in soil quality may be obvious to soil scientists, but is not so to the public. National governments at present do not have direct jurisdiction over large pieces of land, and are not likely to have the political will to interfere much at the lower level. This is the case the more so because the international externalities are not obvious in the main, and many of the effects of soil management are remote in time. Nor do scientists agree upon effects of the different management systems. Indicators that can show the effects may be expensive to develop and monitor, as local conditions are important to take into consideration. It was also postulated that costs will be borne, and benefits enjoyed, unevenly. These factors combined won't make it easy to establish a soil convention. If it were to be implemented, it is doubtful that it would be very effective in securing the aims and objectives a prospective soil convention would have.

4 Recent UN Conventions

4.1 Introduction

Numerous international environmental agreements (IEAs) have been formed in recent years reflecting environmental concerns. The earliest of the major IEAs, CITES, drawn up in 1973, relates to trade in endangered species. Several conventions emanating from Agenda 21, established at the UN Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, are relevant to soil or land. They are covered in Chapters 10, 12 and 14 of Agenda 21, and relate to climate change, biodiversity, desertification, and forests. These are:

- Framework Convention on Climate Change (UNFCCC)
- Convention on Biological Diversity (UNCBD)
- Convention to Combat Desertification (UNCCD)
- Principles for a Global Consensus on the Management, Conservation and Sustainable Development of all Types of Forests (Forest Principles).

The first three are discussed in more detail, as they are relevant to a soil convention. Other conventions worthy of analysis in this context, and included in the present analysis, are

- the Montreal Protocol relating to ozone depletion;
- the Rotterdam Convention, requiring prior informed consent to trade in pesticides and industrial chemicals (PIC); and
- the Stockholm Convention, relating to the use of persistent organic pollutants (POPs).

The features that are likely to contribute to the success or otherwise of a convention in general, as discussed in Section 3, are shown for several environment-related conventions in Table 1. The outcome for each institution, as experienced at present, is added at the bottom.

4.2 United Nations Framework Convention on Climate Change

Meetings relevant to the UN Framework Convention on Climate Change (UNFCCC) commenced in the early to mid 1980s, resulting in the start of the Intergovernmental Panel on Climate Change (IPCC) '…which was required to make an assessment of the science of climate change, the socio-economic consequences of such a climate change and the formulation of realistic response strategies for the management of the climate issue' (Alusa 2000). The first report was reviewed by the second World Climate Conference (in 1991) and led to the recommendation that an international climate regime would be negotiated. Initially, countries signed up to the Framework Convention that was, as the name suggests, merely a framework specifying intentions. A loosely specified agreement encouraged many countries to join. Negotiations settled the details five years later, when the costs and benefits were better understood. Emission abatement details were specified at the Kyoto Protocol Agreement in 1997. However, at the end of 2000, countries failed to agree on how less than agreed emission reductions in one country may be offset by greater cuts in another, using a tradable permits systems. In addition, the role of carbon sinks in sequestering carbon is under debate.

By its nature, the degree of international externality of the production of greenhouse gases is extreme. The magnitude of the problem is not dependent on the location of the emissions. While there is agreement that the global climate is changing and that man-made emissions have contributed to this, the impacts of global climate change are uncertain and remote in time.

Nonetheless, the issue of climate change is considered to be important by scientists and the public alike.

All countries produce greenhouse gases, but the ease with which countries could reduce emissions, and therefore the cost of reduction, varies significantly. The costs of reducing greenhouse gas emissions are complex to calculate and are not evenly shared if based on any simple rule, such as reducing emissions to some historical level. Some countries, such as Norway, can more readily produce alternative sources of energy. Other countries are already very efficient (Japan), with little scope to increase efficiency, while yet others are not (China). A third example of complications in calculating the 'fair share' of a country's efforts to decrease emissions is a difference in growth. Some countries have a declining industrial sector and population (UK), so carbon emissions will decline without much effort, whereas growing countries would have a much harder time (and higher costs) to reduce them at a similar rate. Calculating a fair allocation of emission reductions is therefore open to dispute. Costs of the effects if no action is taken also differ between countries. Arid areas may benefit from additional rainfall, while low-lying island states may vanish altogether.

The benefits of an international agreement (climate change convention) are perceived to be much greater in developed countries than in poor countries. Although signatories to the Convention, developing countries do not have reduction commitments, as many of them are in a phase of development that is very dependent on carbon-based fuels. However, as carbon emissions are reduced in developed countries, carbon-intensive industries are likely to spring up in those countries without commitments. For this reason some developed countries, most notably the United States, want developing countries to take on greater commitments before they will ratify the agreement.

Is the agreement a success? Not yet, at least. It seems unlikely that the Kyoto emission reduction targets will be met, especially now the USA has decided not to ratify the Kyoto Agreement in its present form. As Table 1 indicates, the problem lies in the lack of immediacy of the impacts and the effects of the solution, and the unevenness of the costs and benefits. These issues essentially revolve around equity and efficiency. In addition, there remains considerable scientific uncertainty, for example concerning sequestration and the likely impact of climate change, although baselines, criteria and indicators have been established and monitoring and compliance costs appear manageable. Finally, there are moral dilemmas concerning the role of developing countries. One

positive aspect is that the UN Convention process has focused attention on the problem, and initiated research into alternative fuel sources.

4.3 United Nations Convention on Biodiversity

The UN Convention on Biodiversity (UNCBD) came about completely differently from the UNFCCC. The UNEP Governing Council recognised, in its Decisions 14/2 and 15/36, the need for the protection of biological diversity. In 1988, an Ad Hoc Working Group of Experts on Biological Diversity held its first meeting to advise on the elements of a new international legal instrument (the Convention), and recommended the preparation of a number of studies as a means of responding to specific issues in the process of developing the Convention. UNEP instigated country studies to determine approximate conservation sites and conservation needs that have not been met. The Ecosystems Conservation Group (ECG; consisting of representatives of UNEP, FAO, UNESCO, IUCN, UNDP, WRI (World Resource Institute), WWF, and the World Bank) cooperated in considering draft elements for a UNCBD.

The scientific basis that supported the proposed elements for inclusion in UNCBD was assessed in the Global Biodiversity Assessment (UNEP 1995) after the agreement on UNCBD. Some of the scientists involved in this assessment were the same as those who played a major role in the group of experts meetings preceding the UNCBD. The general public in developed countries recognised the issue as being important.

The provisions in the convention in general are fairly non-specific and relatively inexpensive. They involve little reallocation of resources for each participant, and relate mainly to scientific and technical co-operation, access to genetic resources, and the transfer of environmentally-sound technologies (http://www.biodiv.org).

Biodiversity is typically portrayed as a developed-country concern that is primarily influenced by behaviour and policies in developing countries. People in developed countries like to be assured that whales, elephants and tigers will continue to exist, in spite of degradation of their habitat in developing countries. A clear case of externalities exists, where both costs and benefits are distributed unevenly. The convention aims to protect biological diversity by encouraging countries

to set aside nature conservation areas. This effect is rather immediate, although the effect on the aim, biodiversity, is somewhat slower.

Solutions are complex. For example, the relationship between loss of habitat and loss of biodiversity is tenuous. Definitional problems, such as what constitutes a tropical forest, complicate estimates of loss of habitat. Estimates of annual loss of tropical forests range from 0.5 to 4 per cent (Lomborg 2001).

Scientific knowledge about many of the topics included in the convention is scarce. It is difficult to know how many species actually exist. It is therefore difficult to determine a baseline. Criteria by which to measure success of the convention, and indicators of success, are also difficult to determine. In 1997, at the third meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)[8] the issue of a core set of indicators of bio-diversity, by which to judge progress or otherwise, was taken up. At the fifth SBSTTA in 2000 the proposal of the UNCBD secretariat was rejected, with as a consequence that there are still no indicators (http://www.biodiv.org/doc/sbstta/sbstta5/english/sbstta-5-12-e.doc). This makes monitoring rather difficult if not impossible. The fact that many players are involved does not make it easy to come to agreements.

In summary, the success of the UNCBD to date is only partial at best. Biodiversity continues to diminish at unprecedented rates. While there have been some notable successes in setting aside nature conservation areas, the destruction of habitat driven by pressure to develop remains the essential problem. Despite earlier agreement on the urgency of the problem, the concept of biodiversity has proved difficult to operationalise. Another feature of this convention limiting its success is the unevenness of the costs and benefits. Setting aside a conservation area involves costs to the local community, but none of these costs are passed on to foreign communities who benefit from the existence of species that benefit from the conserved habitat. There are ways around these problems (for example, debt for nature swaps), but these are not easily implemented.

Biodiversity below ground level, in soils, has hardly been discussed, but this may be where the aims of a soil convention could be subsumed into an existing agreement.

[8] The SBSTTA advises the main governing body, the Conference of the Parties).

4.4 United Nations Convention to Combat Desertification

A United Nations Conference on Desertification (UNCOD) was convened in 1977, to produce an effective, comprehensive and coordinated program for addressing the problem of desertification, particularly in Africa. UNCOD was preceded by extensive, global, regional and local studies and consultations involving many scientists, decision makers and relevant institutions all over the world. UNCOD recommended the United Nations Plan of Action to Combat Desertification (PACD). However, the implementation of PACD was severely hampered by limited resources while assessments made in 1984, 1987 and 1989 by UNEP indicated that desertification continued to spread. Indeed the Brundtland Report (World Commission on Environment and Development 1987) observed that it had become one of the most serious environmental and socio-economic problems of the world. The various assessments by UNEP continued to point out that desertification results from complex interactions among physical, chemical, biological, socio-economic and political problems, which were local, national and global in nature.

UNEP assessed the progress of desertification in a number of countries, and produced a World Atlas of Desertification (UNEP 1992). The assessments, the resultant Atlas and the persistent pleas by countries affected by desertification and the socio-economic implications of desertification and its environmental impact persuaded countries to negotiate a Convention to Combat Desertification (UNCCD).

The convention provides for a mechanism by which projects are undertaken by developing countries but the costs of which are borne mainly by developed countries. The UNCCD contains national action plans, but the commitments are very general, such as providing an 'enabling environment' designed to allow local people to help themselves to reverse land degradation, decentralizing authority, improving land-tenure systems, and empowering women, farmers and pastoralists. The UNCCD is funded largely by international agencies, and essentially is aimed at helping poor rural communities in developing countries.

The UNCCD differs from other conventions in that there is little obvious need for collective action. The direct international externalities of desertification are minor, as the effects of, for example,

famine are felt mainly by people within the countries where these events occur. However, the indirect external effects are greater, in the form of humanitarian considerations in countries with the means to alleviate problems. In addition, unrest due to phenomena such as famine is linked to warfare, and destabilisation of a whole region can result.

The problems are rather complex, and there are no simple solutions. This, and the uneven sharing of costs and benefits, are contributing reasons why not all potential players are involved in this convention. The UNCCD has been characterised by some as an instrument through which development aid has been redirected. Much of the funding is supplied by donors and replaces expenditure that might otherwise have been allocated to alternative projects. The absence of significant increases in funding means that, while the convention was negotiated without major difficulties, its effectiveness has been rather limited.

However, the problem of desertification has obvious parallels with other soil problems. Whether the UNCCD can provide a model for a UN Convention on soils is debatable.) In October 2001, at the UNCCD Conference of Parties (COPs; the decision-making body of a convention), the institution of an International/Intergovernmental Panel on Land and Soil was discussed in relation to the reform of the Committee on Science and Technology.

4.5 Montreal Protocol

The Montreal Protocol on Substances That Deplete the Ozone Layer stipulates that the production and consumption of those compounds - chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform - were to be phased out by 2000 (2005 for methyl chloroform). These compounds could significantly deplete the ozone layer in the stratosphere that shields the earth from UV-B radiation. The protocol was signed in 1987 and modified in 1990 and 1992. Ozone depletion emerged as a domestic political issue in the United States in the 1970s, where the use of CFCs in aerosol cans was banned in 1978. The issue gained international importance only in the 1980s. The threat of skin cancer and discovery of the ozone hole over the Antarctic drove public interest. The development of substitutes enabled the negotiations to move ahead.

Most of the world's chlorofluorocarbons (CFCs) and other ozone-depleting substances were made by six multinational firms, and these firms were able to supply the substitutes. In the space of a decade, the substances have largely been replaced by non-hazardous substitutes. Costs were minimal and pertained to all players, and the benefits flowed to all countries. The criteria for an improved situation were lower concentrations of CFCs and other halogens in the atmosphere. The indicators (certain levels of the substances) can be measured, so that monitoring of the situation can take place and confirm improvement of the situation. There were only few players needed for a functioning agreement.

In summary, the Montreal Protocol can be judged effective in that it appears it will solve the ozone depletion problem. The reason is that enough of the factors which make or break an international agreement - agreement of scientists and the general public, substantial externalities, equitable sharing of costs of the producers of the gasses with technical solutions available, a scientific basis to measure progress, with low monitoring and compliance costs and few players, coincided to make it a success.

4.6 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC)[9]

The significant increase in use of pesticide and chemicals over the last thirty years has raised concerns about potential hazards. This is particularly the case in developing countries where information may be scarce, users may not be trained in application, nor have adequate safety equipment. Governments may not be able to control the import of such chemicals. In response, FAO (through a Code of Conduct) and UNEP (through Guidelines) initiated voluntary information exchange programs in 1985 and 1987 respectively, before introducing the prior informed consent procedure in 1989. This helped governments assess risks, and facilitated banning importation of pesticides. Chapter 19 of Agenda 21 called for the adoption of a legally-binding instrument by 2000. It needs to be ratified by 50 signatories to become operational. To date 164 countries have signed up, although only 14 have ratified the agreement so far.

[9] Thanks to William Murray, of the Plant Protection Service (AGPP) of FAO for a substantial contribution to this section.

The objective of the Rotterdam Convention is the improved protection of human health and the environment by facilitating the exchange of information about characteristics on nominated chemicals banned in some countries, such as DDT, dieldrin and lindane (FAO 1999). Thirty-one chemicals are currently listed. Once a chemical is included in the Convention, Interim PIC Procedure countries are invited to make an import decision regarding whether or not they wish to receive further imports of the specific pesticide or chemical. This decision is the 'prior informed consent', which is obtained from a national body in the importing country. Where the answer is 'no', the responsibility devolves to the exporter not to ship the chemical. So the procedure assists importing countries control their imports by sharing the responsibility with the exporters (by them not shipping those products). The guidance document that accompanies each chemical subject to the convention includes where to find further information on alternatives. In some instances, the country may determine that they really do not need to use that chemical at all, and that there are other ways in which the particular crop can be grown that minimise or avoid pesticide use.

Apart from communications on chemicals banned in some countries, extensive information is made available to countries through the Convention. It provides an 'early warning' to countries regarding chemicals that some countries have found to warrant regulatory action (bans or severe restrictions). Once a second country from another region takes a similar action, the chemical is a candidate for review as a chemical under the Convention. Furthermore this round of discussion should also uncover chemicals which are likely to be considered as POPs (due to their characteristics of persistence, bioaccumulation, toxicity and transport; see next section) so that a further early warning is provided regarding chemicals that may be candidates for further (and more stringent) international action, for example for phasing out or elimination.

There is one potential problem with the Convention. The structure leaves it vulnerable to the free-rider problem. The current trade could be rerouted through non-member countries. A large exporting country that was not a signatory could supply members, and conceivably firms in member exporting countries could supply products to the non-member exporter for re-export. It remains to be seen to what extent this problem will impinge on the effectiveness of the Convention.

As few countries have yet ratified PIC, it is too early to assess its effectiveness, but it is instructive to see how it measures up against several criteria. Consider the sharing of costs and benefits. As is commonly the case, there is relatively little analysis of the effects of this convention. Some manufacturers and exporters can expect to lose because they can no longer export particular products. However, PIC has effectively created a new market for a later generation of chemicals by prohibiting trade in the older versions, where patents may well have run out anyway. Many firms may well gain from these changes. For the importers there may be an immediate loss in that they will need to source other substances, but in the medium to long run there should not be much cost to them, as their income is likely to be related to total imports. The losers are the users of the no longer imported substances (agricultural producers), as the different production method or new pesticides are bound to be more expensive (also counting possible forgone production) than the substances they replace. How high the net costs are will depend on whether farmers can pass the increased production costs on to consumers. This depends on factors such as location of market (domestic or export) and the price and income elasticities of product demand. The benefits are to the country in general, in lower health and environmental costs. Some developing countries may not have the administrative infrastructure to control imports and use of chemicals, and control at the border may be a more workable method.

In summary, the immediate costs are highest in the importing country, but the health and environmental impacts are lessened there also. Costs are likely to vary across countries depending on their dependence on listed chemicals. Countries that implement restrictions are likely to gain most of the environmental benefits. Costs and benefits countrywide are likely to be well matched, though there are different winners and losers within the country.

Although it is too early to tell whether this convention will be effective, it does seem to satisfy most of the criteria for a successful agreement. There is a consensus among scientists and the general public about the need for an agreement. There is little scientific uncertainty and the solution is not complex. Furthermore, it is (relatively) simple to establish a monitoring and compliance system. The effects of limiting chemical use are almost immediate, though not necessarily immediately visible. The main costs of the restrictions pertain to the importing countries, but so do many of the benefits, although the winners and losers may not be the same. Finally, there are some international externalities, as chemicals used in one place may find their way into the environment or the food

chain and have trans-boundary effects. It is important to recognise that the Rotterdam Convention alone will not solve the problems associated with trade and use of toxic chemicals, as it is effective only if the importing countries take action. It does, however, provide countries with information and a tool to assist them in making and implementing sound regulatory decisions regarding the use of certain hazardous chemicals.

4.7 Stockholm Convention on Persistent Organic Pollutants (POPs)

The Stockholm Convention sets out control measures covering the production, import, export, disposal and use of persistent organic pollutants (POPs). The 12 initial POPs are aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, polychlorinated biphenols (PCBs), hexachlorobenzene, dioxins and furans. These chemicals last for years or decades after release, are considered highly toxic and can be transported long distances in the environment. POPs tend to accumulate in the fatty tissue of animals, sometimes far away from the source of release. To this extent, the Stockholm Convention addresses a problem with global externalities. Once signed and ratified, Governments are to promote the best available technologies and practices for replacing existing POPs while preventing the development of new ones (UNEP 2001).

Trade in seven of the 12 POPs is regulated by PIC, discussed in the previous section. POPs was initiated in 1995 when the Intergovernmental Conference to Adopt a Global Programme of Action for Protection of the Marine Environment from Land-Based Activities called for talks on a legally-binding treaty to reduce or eliminate the discharge, manufacture, and use of the 12 POPs. Negotiations concluded in 2000.

Most of the 12 chemicals are subject to an immediate ban. However, a health-related exemption has been granted for DDT, which is still used in many countries to control malarial mosquitoes. This permits governments to protect their citizens from malaria – a major killer in many tropical regions – until they are able to replace DDT with chemical and non-chemical alternatives that are cost-effective and less environmentally damaging.

There appears to be a consensus that the argument for phasing out these chemicals is strong, both within the scientific community and the public. Since a complete elimination of use is mandated,

the cost of monitoring and compliance is manageable. However, there are two difficulties. First, although there are international externalities attached to the use of pesticides, these are relatively small compared to local costs. Most of the cost of the pollution stays in the country where the pesticides are used. The need for international cooperation is not as compelling as for climate change or ozone depletion, for example. The second difficulty relates to the distribution of costs. As the United States has already prohibited use of these pollutants within its country, it bears no cost from implementing such an agreement. However, the countries that still use these pollutants will have to search for alternatives. As in the case of PIC, the alternatives are likely to be more expensive, albeit better for the environment. In so far as the costs of pesticide use are local, the costs and benefits of taking action under POPs are matched. What would persuade a country to join such an agreement when most of the benefits could be obtained by banning the chemicals themselves? The answer may be compensation, in the form of technology transfer, donor aid and other forms of support.

Effectiveness of the Stockholm Convention will probably be in proportion to the number of players ratifying the agreement. Reduction in use in one country may lead to increased use in non-signatories as industries dependent on the chemicals migrate from one country to another, but the magnitude of this effect is considered slight. The convention is likely to be at least moderately effective.

4.8 Summary

In this paper, an argument has been made that the topic of soils, and its treatment by human activity, is not particularly suitable for a UN Convention. Characteristics of likely success were examined, and examples of environmental conventions provided, analysing them according to those characteristics. Factors included are a perceived need for action, both in the minds of scientists and the general public; immediate, dramatic and relatively certain effects when no action is taken; and significant international spill-overs. In additions, potential signatories to a convention must believe that they would benefit in some way, where benefits and costs are reasonably evenly distributed, and that the benefits cannot be obtained if they abstained. Fewer players may find it easier to agree on measures that need to be taken than when there are more players. Not all of these characteristics need to be present for a convention to be successful, but the likelihood of success increases with

more, rather than less compliance. According to this analysis, the Montreal Protocol, PIC and POPs should be the most likely candidates for success.

5 Summary and policy implications

Since the 1980s in particular, the world has looked towards UN Conventions to solve problems it perceives to be global in nature. Agenda 21 of the UNCED in Rio de Janeiro in 1992 gave impetus to several, such as those pertaining to climate change, bio-diversity and combating of desertification. There have been voices in the past to promote a similar arrangement in the area of soils, but no great progress has been made in the establishment of such an organisation. The question is, is it advisable to work towards such a convention, or is the effort likely to be a poor use of resources that could be better allocated elsewhere?

It is argued in this paper that the topic of soils, and its treatment by human activity, is not particularly suitable for a UN Convention. Characteristics of likely success were examined, and examples of other conventions provided, analysing them according to those characteristics. Factors included are a perceived need for action, both in the minds of scientists and the general public; immediate, dramatic and relatively certain effects if no action is taken; and significant international spill-overs (externalities). In addition, potential signatories to a convention must believe that they would benefit in some way, where benefits and costs are reasonably evenly distributed, and that the benefits cannot be obtained if they abstained. Fewer players may find it easier to agree on measures that need to be taken than when there are more players. Not all of these characteristics need to be present for a convention to be successful, but the likelihood of success increases with more, rather than less compliance. According to this analysis, the Montreal Protocol, PIC and POPs should be the most likely candidates for success.

If a soil convention is analysed according to these criteria, it must be concluded that success is unlikely. Apart from the present absence of political will to institute yet another convention, the general public is not convinced of the importance of the problem with declining soil productivity and scientists themselves are divided on the issue. The benefits of internationally coordinated action are delayed rather than immediate and small given the limited extent of international externalities. Any country can capture most of the benefit of what it does and is not greatly affected by the

actions of others. Indeed, agricultural exporters may see themselves as worse off when other countries improve their land use management. In terms of implementation, the solution is complex, given the diversity of soils. It would be difficult to establish a baseline, criteria, indicators and measures. Monitoring and compliance costs are likely to be high unless a simple measure such as area under crops could be established. Depending on the details of the agreement, the costs and benefits of soil improvement can be unevenly distributed and equity issues could therefore be considerable.

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Table 1: Characteristics of conventions

	Soil Convention	**UNFCCC**	**UNCBD**	**UNCCD**	**Montreal Protocol**	**PIC**	**POPs**
Characteristics	**Soil quality**	**Climate**	**Biodiversity**	**Desertification**	**Ozone**	**Chemical trade**	**Use of persistent organic pollutants**
Stated objective	Maintain and improve soil health	Decrease in greenhouse gas emissions	Maintain biodiversity	Limit soil degradation in arid areas	Decrease ozone-destroying gasses	Limit trade in dangerous chemicals	Eliminate use of specified chemicals
Compelling objective? Scientists General public	 Divided No	 Yes Yes	 Yes Yes	 Yes Yes	 Yes Yes	 Yes Yes	 Yes Yes
Timing of problems and effect of actions	Mostly delayed	Delayed	Immediate	Immediate	Delayed	Immediate	Immediate and long-term
International externalities: Direct Indirect	 Minor Considerable	 Substantial	 Significant	 Minor Substantial	 Substantial	 Some	 Some
Matching of costs and benefits	Uneven	Uneven	Uneven	Uneven	Equitable	Equitable	Equitable
Complexity of solution	Very complex	Complex	Complex	Very complex	Simple	Simple	Simple
Scientific basis Baseline Criteria Indicators	No agreement	Uncertain Yes Yes Yes	Uncertain	Not applicable	Certain Yes Yes Yes	Certain Yes Yes	Certain Yes Yes
Monitoring and compliance costs	High	Low	High	Not applicable	Low	Low	Low
No of players required	Few	Many	Many	Few	Few	Many	Few
Likely outcome	Doubtful	Targets not met	Limited effectiveness	Limited effectiveness	Effective	Moderately effective	Moderately effective?