

**GLOBAL SCIENCE, GLOBAL POLICY:
LOCAL TO GLOBAL POLICY PROCESSES FOR
SOILS MANAGEMENT IN AFRICA**

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SUMMARY

The creation and selling of ideas of global environmental crisis has been a core characteristic of the post-Rio decade. Global science and global policymaking processes are central to these crises. However, framings of global environmental problems – the knowledge claims and interests that underpin them, and the plans that flow from them – are often accepted without critical examination. The idea of an African soil fertility crisis is one such case. To illustrate this, the paper traces the history of the Soil Fertility Initiative (SFI) for Africa, a major multilateral programme. We look at the role of science in creating both a problem and potential solutions to that problem. In both cases substantial uncertainties were ‘black-boxed’, as supposedly distinct worlds of science and policy interacted to create an agenda for action. The formation of actor-networks running within and between organisations, and from global to local scales was central to this policy process. Following the SFI to the present we document that not as much has flowed from the Initiative as initially envisaged. While bureaucracies may easily coalesce around a problem and make a big noise, translating rhetoric into concrete action is much harder. The unravelling of the SFI, we suggest, can be explained as a consequence of bureaucratic politics between and within the key players, and also as a result of inadequate links between global and local scales. The implications for international activity – conventions, strategies, action plans and so on – are serious. Too often what claims to be global is really not global at all – but has barely concealed links to localities in the North. Accordingly, the challenge is to design more effective global processes allowing more meaningful inclusion of diverse local problem framings.

1. INTRODUCTION

This is a history of the selling of a story. A story of potential crisis and disaster for the soil resources of Africa. A story whose conclusions lead to a particular set of actions requiring an international response. The story's characters, connected in various and changing ways, are scattered across the world – in Rome, Washington, Wageningen, and a range of African capitals. They include scientists, consultants, government and aid bureaucrats, politicians, and complex hybrids between these. The story emerges over several years through the writing of august scientific papers, the production of glossy brochures and flash websites, the creation of soundbites of information and statistics, attendance at meetings and workshops and informal conversations and lobbying. All combine to muster support, get interest and sell the idea to politicians, funders and others.

Global environmental crises – such as the soil fertility crisis in Africa which this paper focuses on – have been a media, research and policy concern for some time. The Rio conference of 1992 spawned a range of frameworks, conventions and initiatives to respond to these by setting up an international architecture for problem assessment, regulation and project funding. In 1996, for example, the Convention to Combat Desertification entered into force signed by 110 countries, and joined climate change and biodiversity as one of the key global environmental issues with pledges for action across the globe, but particularly in Africa.¹ In this paper we concentrate on the construction of land management issues in Africa as an international environmental problem and take as a case study the Soil Fertility Initiative (SFI). This was launched by FAO and the World Bank in 1996 with much fanfare, and with an impressive array of collaborators and supporters. Linked as it is to a variety of other initiatives similar in aim this case potentially offers insights into the way knowledge, power and practice interact in the construction of global policy issues.²

The process of construction we describe is about two processes. The first, is about the social and political processes surrounding the creation of globalised knowledge that claims to be able to speak about very large areas. The second relates to the development of forms of organisation that are international, offering the potentials for the global management of environmental issues. We argue that the two processes are critically interlinked. This examination of the framing of problems by science in interaction with bureaucracy helps, we suggest, both explain the persistence and illuminate the contingency of some frequently unquestioned, but urgent, policy problems.

The paper is based a combination of semi-structured interviews with over 50 key informants, documentary analysis based on published and grey literature available in text and web formats and active

¹ By March 2000, 163 countries had ratified or were in the process of ratifying the convention. The governing body for the convention is the Conference of the Parties, where all governments that have ratified the convention are represented. Under the terms of the convention each country is committed to designing and implementing a National Action Programme. It should also be noted that while the Convention is a global process and instrument, it has concentrated on Africa, and is widely seen to have come into existence out of a concern for Africa, and also as a complement to the other conventions that were perceived by some as 'Northern' concerns. For more details, see: www.unccd.ch.

² While it is true that the SFI is only an African initiative, it can still be thought of as a global problem because it was created by players within the global arena. It is also very similar to other land degradation activities such as the Convention to Combat Desertification which are concerned with several continents.

participation in a number of workshops, seminars, conferences and policy reviews over this period.³ The interview work was carried out between 1997 and 1999 in Africa, Europe and North America with individuals in a range of different organisations, including scientists and managers in institutes part of, or linked to, the CGIAR (Consultative Group on International Agricultural Research) (including ICRAF (International Council for Research on Agroforestry), IFPRI (International Food Policy Research Institute), CIMMYT (International Wheat and Maize Center), IFDC (International Fertiliser Development Center), TSBF (Tropical Soil Biology and Fertility Programme), universities and research organisations (including Wageningen Agricultural University, the Netherlands; Reading University, UK; Wye College, UK; Natural Resources Institute, UK, International Institute for Environment and Development, UK and various university/National Agricultural Research institutes in Ethiopia, Mali and Zimbabwe); bilateral aid agencies (including the DFID, UK; NEDA, the Netherlands; GTZ, Germany; SIDA, Sweden; SDC, Switzerland); and multilateral agencies (including FAO, UNSO, UNDP and the World Bank).

The paper is organised as follows. The next section sets out a theoretical framework for examining these issues: a framework that helps explain how science and bureaucracy interact to shape policy agendas. The following section looks at narratives about a soil fertility crisis in Africa. We then look in more detail at the practices of science and scientists in representing the soil fertility problem. The following section emphasises the importance of looking at the activities of individuals and suggests that it is the actions of key protagonists that is critical to the way an issue is discussed and set up as a problem requiring action. The subsequent section examines the importance of the bureaucratic context within which scientists interact and networks of actors engage. The paper concludes by arguing that in the future there may increasingly be challenges to the type of global frameworks and framings of global problems described in the paper. We suggest what some of these might be and the implications for global science and policy initiatives.

2. UNDERSTANDING POLICY PROCESSES: THEORETICAL PERSPECTIVES

Our point of departure is that references to ‘the environment’, ‘land degradation’ or even ‘soil fertility’ are representations and are necessarily value laden, reflecting historically and institutionally situated social and political concerns. There is no external environment we can refer to unproblematically (Hannigan 1995; Scoones 1999). Our concern is not to comment on the whether soil fertility is a problem or not – it clearly is in certain places and for certain people. Rather we want to trace how such claims are made, exploring the social commitments and embedded contexts of policy debates. In this paper we focus on the global dimensions of the policy process, and how knowledge and ideas circulating at the international scale influence policy in particular ways.

³ During the period of this research we have been actively engaged in two research-action networks dealing with soils management in Africa – Nutrient Networking in Africa (NUTNET) and Indigenous Soil and Water Conservation (ISWC, Phase II). These have been coordinated by AB-DLO, Wageningen and CDCS, Free University, Amsterdam and have been supported by the Netherlands aid agency, NEDA. In addition, we have been involved in the preparation of a review on policy issues relating to soil fertility management for DFID.

The internationalisation of the environment debate has moved in step with larger processes of globalisation. Patterns of globalised communication and exchange of goods and ideas are part and parcel of today's world. With the Rio accords international regimes have also developed which attempt to provide mechanisms for global governance of the environment (Porter and Brown 1991; Haas *et al.* 1993). Global environmental problems, it is argued, cannot be managed by individual nation states alone. There are perhaps three broad types of global environmental problem commonly responded to by international regimes. The first is a problem where the same, single phenomenon affects different countries in the world, albeit not necessarily equally. In these instances actions by one country may not result in a great change without coordinated actions by others, as in the case of climate change. A second type is where the source of a problem is more specifically locatable in a particular country, and where there are knock-on effects for others, as in the case of downstream pollution impacts. A third type of problem is where a number of countries all face similar problems, but solutions are seen to derive from international coordinated action which leads to improved awareness and more efficient responses. It is this type of international action which is imagined for the perceived soils crisis in Africa, and justifies the type of international public good investments associated with the Soil Fertility Initiative or the Convention to Combat Desertification.

Much of the debate surrounding the global governance of environmental issues focuses on the challenging institutional, legal and political questions of establishing effective regimes, whether from realist or liberal institutionalist perspectives (Vogler 1996). But in these debates the nature of the problem often goes unquestioned: these are simply technical issues, clear problems which should be amenable to global management. Not so of course. As has been shown in relation to a problem like climate change the precise nature of the global problem can be subject to intense disagreement (Boehmer-Christiansen 1996; Taylor and Buttel 1992; Yearley 1996). What is eventually decided upon reflects balances of power between a diversity of scientific, bureaucratic and political interests. This paper will explore some of these contests over knowledge claims in the global arena through the soils management in Africa case. A deeper exploration of such issues in context – unpacking the interactions between science and policy in practice, in different bureaucratic and political settings – provides an opportunity to reflect on the efficacy of the new post-Rio forms of policy process, using the Soil Fertility Initiative in particular as a case study.

Of particular interest in the creation of 'global' science and policy is the interaction between the global and the local. The simultaneous processes of globalisation and localisation create a fluid and diverse range of settings for the co-production of science and policy (cf. Appadurai 1996). While global knowledge, linked to global institutions initially appears all powerful, such framings should not be taken for granted. Rather they are the product of the activities and strategies of concrete actors. Particular forms of knowledge – be it the 'high science' of sophisticated computer modelling of soil characteristics and dynamics or more lay understandings of soil processes based on 'indigenous technical knowledge' – need not be seen as distinct (Agrawal 1995; Murdoch and Clark 1994). There are a variety of actor-networks, creating different images of the global, with different local roots. Some are clearly more extensive and more powerful than others, but, as the case study explored later in the paper shows, things change, and new configurations of actor-networks emerge associated with new connections between the global and the local and new constructions of

knowledge about the environment linked to these. Thus the construction of local settings is informed by different borrowings from the global discourses. Local experiences therefore may help shape the accepted definition of the global. Equally, global processes do not just impact on and unidirectionally shape the local, they are inevitably refracted and reinterpreted through different local settings.

In seeking to interrogate these issues we have used elements from several different literatures. We begin with the concept of narrative, developed in the field of literary theory. In recent years the notion that story-lines or narratives have a profoundly structuring effect on development policy and programming has become influential (Roe 1991; Leach and Mearns 1996). Narratives can be seen as highly programmatic cause-and-effect stories that are strongly compelling – they shape perceptions of a problem and subsequently exert a strong pull on the behaviour of individuals and groups. These narratives are part of a larger discursive understanding of policy problems. Discourses can be understood as the interaction of linguistic framings of issues and institutionalised practices (Hajer 1995; Apthorpe 1996).

When we think of institutionalised practices we are thinking particularly of bureaucratic and scientific practices, accumulations of history, reflecting cultures and interests. Larger configurations of political interests are also important. These discursive practices taken together have a structuring affect on the activities of individuals, and in this way they shape policy and policy processes. However, structuring processes are not totally determining – since structures are agglomerations of practices it follows that individual choices can make a difference (Giddens 1984).

In this paper we draw on Latour's work on actor-networks (1987; 1993), to emphasise the way individuals can exercise agency, and by doing so may help make particular types or pieces of knowledge influential, or contribute to the creation of policy with a particular shape.

Following this process allows us to identify who is involved in knowledge creation and which linkages are critical. Our aim in this paper is not to dispute the claims being made, but more to offer some caution about their universality by highlighting some of their implicit commitments and assumptions, and, perhaps, as a result, open up some space in the debate for other voices and perspectives, leading, ultimately we hope, to a more robust and effective approach to policy and practice in this important area.

Latour sees 'science in action' as a process whereby the 'construction of facts. . . is a collective process' (Latour 1987: 104), where 'black boxes' (defined by Latour [1987: 139] as hard facts, powerful theories, indisputable evidence) are created and then both transmitted and transformed through networks of different actors. According to Latour, 'the black box moves in space and becomes durable in time only through the actions of many people; if there is no-one to take it up, it stops and falls apart' (Latour 1987: 137).

Those wanting to build an argument therefore must enrol others in their project, ensuring that the argument does not get too dramatically transformed in the process and recognised authorship is maintained. Latour identifies a number of different tactics. Enlisting others by appealing to their explicit interests is the most obvious, whereby your interests overlap to such a degree that mutual advantage is found in joining forces. In other cases, others can be enrolled if they piggy-back on the idea for other reasons, but here there may be two contrasting problems: either indifference, where those enlisted do nothing to promote the idea, or overwhelming and sometimes misguided enthusiasm, where 'your tentative statements can be turned into

claims of gigantic size' (Latour 1987: 110). Another tactic is to reshuffle interests and goals, for instance through the creation of new groups who are offered new objectives and a site for a new coalition around which narratives can be built.

Such networks emerge through associations of power (Law 1986). Latour argues that 'since the proof race is so expensive only a few people, notions, institutions or professions are able to sustain it, this means that the production of facts...will not occur everywhere and for free, but will occur only at restricted places and at particular times'. Such power exists through access to both human and material resources. Particular types of resource are needed to make credible claims. These may be in the form of particular types of data, graphical representations, computer models and published papers in certain journals. But access to these is not open to everyone. Financial research resources is one obvious limitation for many, but perhaps as important is access to the fora where power is centred, networks are built and claims established, whether around expert consultations, specialist conferences, or invited contributions to journal issues. The process of mobilisation (Callon 1986), or the spreading of a particular viewpoint therefore depends on interaction with effective networks and the application of human and material resources to the endeavour.

In the networks linking science and policy arenas, different actors often have contrasting perceptions of the claims being made. Very often, those close to the centres of fact building understand and recognise the uncertainties and ambiguities inherent in the assumptions underlying particular claims. However, those further away – those who fund or manage the research, but do not produce the claims – are less troubled by such uncertainties. This has been called the 'certainty trough' (Shackley and Wynne 1995, quoting MacKenzie 1990), where key assumptions are conveniently ignored by certain groups of knowledge managers and users in order to present the claim as fact and, in turn, an incontrovertible policy imperative.

Hesitant scientists are often dragged into the 'certainty trough' because of the networks that have been created. Scientists are reliant on the knowledge managers for research support, and thus, at least in public representations of their position, qualifications and caveats are often dropped (or banished to discreet footnotes) in favour of the bolder, clearer, simpler position. But equally, knowledge managers, scientific advisors and gatekeepers and policy-makers are reliant on scientists to provide the justification for their position, resulting in an often uncritical reliance on limited networks of fact-building advisors based at the centre.

The interaction of science and policy can therefore be seen as a process of mutual construction. Where, through the interaction of knowledge and power, science and society are co-produced (Jasanoff and Wynne 1997). In other words, science is not dissociated from the social and political worlds of policy processes, the two emerge in tandem. Thus the social commitments and values inherent in policy are deeply implicated in the construction of scientific 'facts' (Wynne 1996; Latour 1999). In this process the institutionalised practices of science and policy-making are a key part of the power of discourse and one of the parameters within which individuals exercise their agency. Thus the seemingly mundane daily activities of scientists and bureaucrats engaged in the preparation of scientific papers or consultancy reports, the elaboration of models, participation in workshops, meetings or email discussion groups, and engagement in formal and informal policy briefings are a central part of the joint production of science and policy. Such practices may be central

to the activities ‘epistemic communities’ of scientific experts who transcend national boundaries and, through their actions, influence the processes of policy-making within and between nation states (Haas 1992).

With science and policy-making seen as social phenomena embedded in a set of practices, critically linked to networks of individual actors and bound up with bureaucratic and political settings, a frame of analysis is offered for the examination of policy processes (Keeley and Scoones 1999). Before turning to a detailed examination of the Soil Fertility Initiative case study, it is first necessary to see how and why soil fertility in Africa is seen as a policy problem. In the next section we set out some of the narratives informing this discussion.

3. CREATING A STORYLINE: THE EMERGENCE OF A SOIL FERTILITY NARRATIVE FOR AFRICA

Soil fertility as a policy problem does not emerge randomly, or in intellectual isolation. It should be seen as linked to a set of deeply held assumptions and beliefs about rural development, food security and agricultural development in Africa. These narratives are entrenched as intellectual and practical organising principles. Why do they matter? They matter because, as firmly rooted worldviews, they shape judgements and behaviour. Sets of assumptions and premises are key. While the logic that flows from them may be good, it is nevertheless the case that, if the first premise is flawed, then whole courses of action, plans, programmes and policies can arise which are at root misconceived.

Two key narratives underlie the argument that there is a soil fertility crisis. The first of these can be cast as a ‘food-gap’ narrative. In this Malthusian view, population growth rates are contrasted with anticipated growth in cereal production, and one is subtracted from the other to leave scenarios of alarming and unsustainable aggregate food deficits in the future. The recent World Food Prospects report produced by IFPRI warns that ‘the world’s farmers will have to produce 40 per cent more grain in 2020, most of which will have to come from yield increases...however, growth in farmers’ cereal yields is slowing’ (Pinstrup-Andersen *et al.* 1999). A paper in the IFPRI 2020 Vision series argues that present trends in agricultural, economic and population growth will result in Africa needing to import 27 million tons of cereals in 2020 as opposed to 9 million at present (Badiane and Delgado 1995:2; Agcaoili and Rosegrant 1994: 1).⁴ In 1996 a World Food Summit was organised by FAO precisely to bring attention to this issue. Publicity for the summit warned strongly against complacency, arguing the world will need to feed an extra 3 billion people by 2030, requiring a 75 per cent increase in food supplies (FAO 1996).⁵ Ismail Serageldin (2000), chair of the CGIAR warns:

The world’s population is expected to exceed 8 billion by 2025, an increase of 2.0 billion in the next 25 years...there will be more mouths to feed in complex circumstances. Norman Borlaug calculates that ‘to meet projected food demands, by 2025 the average yield of all cereals must be 80 per cent higher than

⁴ IFPRI does not in itself have ‘a line’ as a senior researcher in the institute commented to us. However, it is fair to say though that the extremely successful (in terms of research impact) 2020 Vision research has provided intellectual support for a food gap perspective.

the average yield in 1990'. These increases must come primarily from increasing biological yields, not from area expansion and more irrigation.

This story-line is associated with a range of key players in the international food, agriculture and natural resources debates. In addition to those linked to the CGIAR (1995), it is also frequently heard emanating from agricultural economists in the World Bank as the intellectual underpinning for investment plans designed to promote agricultural growth. Targets of various sorts based on such analyses are favourites for the bilateral aid agencies.⁶ NGOs also make use of this sort of argument to justify their interventions. For example, the influential Sasakawa-Global 2000, the brainchild of Norman Borlaug, 'father of the Green Revolution', and now a key player in the agricultural sector of many African countries.⁷ The food gap story-line also frequently gets media headlines in the well-publicised announcements of Lester Brown and the World Watch Institute, and their annual State of the World reports.⁸

A second important narrative is that which proclaims a crisis of environmental degradation. This pessimistic view of population and environment interactions has dominated thinking about the environment since the Club of Rome reports in the 1970s (Meadows *et al.* 1972).⁹ This perspective is – as with the food-gap narrative – Malthusian in flavour. A recent 2020 Vision Briefing by researchers from IFDC begins: 'as the region's [Africa] population continues to grow rapidly, outpacing the growth rate in other regions of the world, its agricultural land is becoming increasingly degraded' (Henao and Baanante 1999).¹⁰ This view is articulated particularly clearly in the work of Kevin Cleaver at the World Bank. Together with Schreiber, he presents negative trends in agriculture, population and natural resource management coming together in an alarming 'nexus' which in itself sets off further rounds of poverty increase and environmental degradation (Cleaver and Schreiber 1995).¹¹

These arguments are invoked as part of the rationale for action in the Concept Note for the Soil Fertility Initiative prepared by the World Bank. Shortened fallows and expansion of farming into marginal areas, it is argued, lead inexorably to degradation of resources. To quote:

⁵ For other perspectives on the food gap see Lipton (1999); Wiggins (1995); Dyson (1996).

⁶ Bilateral donors, the World Bank and the United Nations have agreed international development targets through the Development Assistance Committee of the OECD. These include the aim of reducing the number of people in extreme poverty by half by 2015, and for the environment, ensuring the implementation of a national strategy for sustainable development by 2005, and reduction in trends in the loss of environmental resources by 2015. For more information see, www.oecd.org/dac/Indicators/htm.

⁷ Sasakawa Global 2000 currently operates in 11 African countries, and seeks an African Green Revolution based on demonstration and transfer of packages of improved varieties and fertiliser. For more information see, <http://energyhouse.com/sasakawa.htm> and *Feeding the Future*, the magazine of the Sasakawa Africa Association.

⁸ See, www.worldwatch.org.

⁹ Other important statements in a similar vein from this period include *Blueprint for Survival* (the Ecologist 1972) and *Population Bomb* (Ehrlich 1968).

¹⁰ Scherr and Yadav argue: 'If accelerated erosion continues unabated, yield reductions by the year 2020 may be 16.5 per cent for the continent and 14.5 per cent for Sub-Saharan Africa' (Scherr and Yadav 1997). For a recent statement of the seriousness of global environmental problems see the *Global Environmental Outlook* produced by UNEP (UNEP 2000).

¹¹ Cleaver's 'nexus' ideas were particularly influential around the period when the SFI was getting off the ground. They are cited, for example, in the first paragraph of the important article by Sanchez *et al.* (1997: 2) and in the key initial soil fertility concept note produced by the Bank (1996:3).

The nexus of rapid population growth and high population densities, low productive agriculture and depletion of natural resources has created negative synergies that exacerbate existing conditions of soil nutrient mining and underdevelopment, thus creating a vicious circle of poverty and food insecurity (World Bank 1996: 4).

It is argued that these issues are so serious that:

Without restoration of soil fertility, Africa faces the prospect of serious food imbalances and widespread malnutrition and likelihood of eventual famine (World Bank 1996: 1).

Indeed, for some, addressing issues of soil fertility is absolutely fundamental to the unlocking of Africa's developmental potentials. The ICRISAT website quotes Henk Breman now of IFDC:

Over the years stupendous efforts have been made to bring the Green Revolution to Africa. Yet, the magic that has worked in Asia and elsewhere in the world has somehow eluded Africa. Many theories have been proposed, but the one that is gaining ground is in a way the most revolutionary, because it doesn't agree completely with what most people think is the biggest limiting factor. In fact one can say, 'fertilisation is irrigation', stated Dr Breman, because it has been found that soil improvement increases the water use efficiency of crops and leads to higher recovery of applied nutrients.¹²

The point made by Breman is key to understanding the bite of soil fertility narratives. It is argued, in the context of the larger food and environmental crises, that soil fertility is not just one component problem but that it is actually the lynchpin, the factor that, if addressed, will result in the much sought after transformation. According to one eminent international research scientist we talked to: 'looking at soil fertility can transform agriculture and get us out of the food security trap – the same as with HYVs in Asia'. Sanchez *et al.* make the argument that: 'per capita food production will continue to decline unless soil fertility is effectively addressed' (Sanchez *et al.* 1997: 13).¹³ Likewise, Christian Pieri, of the Agriculture and Natural Resources Department at the World Bank, a board member of IFDC, author of a central text on African soil fertility (1989), and another key figure to the history of the Soil Fertility Initiative comments: 'donors are well aware of the fact that within the chain – food security – agricultural development – protection of the global environment – the main link is soil fertility maintenance'.¹⁴

Likewise, the answer to the land degradation crisis does not lie with traditional approaches. As a senior international scientist argued: 'land degradation concentrates on soil erosion ... but economists don't know the limits of soil erosion plots ... and they miss the boat. Soil fertility is now more important than soil erosion'. We have then a narrative in which the soil fertility problem is located within wider views of food

¹² The article is 'Soil Fertility Initiative: the *sine qua non* for boosting productivity' located at www.icrisat.org/text/news/soil_fertility_initiative. See also Breman, (2000).

¹³ The argument is also made by Sanchez: 'per capita food production will continue to decrease unless soil-fertility is effectively addressed' (Sanchez *et al.* 1997: 3). See also Pinstrup-Andersen *et al.* (1999: 25); Oram (1995); Donovan and Casey (1998).

¹⁴ Comment recorded at the SFI Recapitalization workshop in Lome, 1997; (www.ifdc.org/SoilFert.htm).

and land degradation crises, but with a critical twist where it is presented as actually pivotal rather than subsidiary.

Having set a broad scene and then located the key to the crisis, the narrative then moves from diagnosis to prescription. A key part of the solution is that action is needed – and that this entails some form of international mobilisation:

During the next 10–20 years, if West African governments and the international community adopt a ‘business-as-usual’ attitude, it would not be far-fetched to predict that there would be gross migration from the drier countries bordering the Sahara desert to the more humid countries farther south. This would probably be followed by mass starvation (IFDC 1996: 5).

What action is needed from the international community to avoid ‘mass starvation’? Exactly what benefits are proposed to flow from coordinated international action? The then Vice-President of the Environmentally Sustainable Development Department of the World Bank, Ismail Serageldin made the case for the SFI at its launch in November 1996, saying:

We therefore welcome the Soil Fertility Initiative as a new form of collaboration among international institutions to promote collective dialogue, reach consensus on critical issues, avoid duplication of effort, share information and formulate effective strategies to increase the productive capacity of soils, especially in regions where inadequate plant nutrition management threatens food security.

Soil fertility is seen by some as the key entry point to a range of policy areas. While the starting point may be apparently the rather dull, technical issue of soil fertility management, the implications for policy are wide. In an introduction to the SFI on the IFDC website¹⁵ it is argued that:

African governments have to wake up to the urgency of the problem...the Initiative seeks primarily to convince governments of African countries to create a favourable climate – in terms of land reforms, credit availability and input accessibility – that will allow farmers to adopt sound resource management practices.

We have argued that the food-gap and population-environment nexus are two powerful development narratives, and that the particular narratives surrounding soil fertility management in Africa both add something and bring the two narratives together. We have suggested too that these narratives emerge out of the international development arena and that one of the key things they do is to provide a rationale for further action by those located in that milieu – those charged with the jobs of ‘waking-up’ and ‘convincing’.

So what type of action is proposed? In our discussions, most informants suggested a range of activities which embrace some combination of policy reform, institutional change, technology transfer and scaling-up support for local initiatives and efficient local practices. However, specific emphases do emerge. Concerns with the food-gap frequently lead to an advocacy of greater use of inorganic fertilisers. Numerous policy

¹⁵ www.ifdc.org.

documents cite the low levels of fertiliser use per hectare in comparison with northern countries or other countries in the South, such as India or China, as a matter of great concern.¹⁶ For some this offers the potential for an African Green Revolution – a transformation of agriculture through intensification and the adoption of modern technologies – akin to the dramatic changes in Asia in the 1960s and 1970s.¹⁷

Others concentrate less on fertiliser specifically, but rather on developing new combinations of fertilisers and organic sources of nutrients. As a senior figure in one international research institute proclaimed:

Soil fertility is a natural resource...ions are ions – plants are neutral about nutrition...the old paradigm is dead, now its integrated organic and inorganic solutions, rejecting the extremes full fertilisers or pure organics.

The relative emphases placed on different narratives can become critical as they reflect different perceptions about the degree to which ‘external’ resources and technologies are essential for the resolution of the crisis of African soils.¹⁸

But whatever the relative emphases, a new project emerges, and a new concept to guide development agendas: the recapitalisation of soils. One scientist commented: ‘Soil capital is shrinking. You get lower returns from the same amount of nutrients. Only with capital do inputs lead to higher outputs’. The metaphor of ‘capital’ is frequently a central part of the narrative form, whether used by protagonists arguing for organic build up or renewal through inorganic applications. This, in turn, links to other key terms used, including notions of soil ‘mining’ and imbalances in nutrient ‘budgets’. Through the use of metaphors from economics, accounting and mining the message comes across loud and clear. You can carry on with current practice up to a point, but without replenishment then the moment of reckoning will eventually arrive, and this, according to some, is perilously close. This, then, provides the justification for a major recapitalisation initiative to restore and enhance soil productivity.

The argument for a global response rests on more sophisticated arguments about soil capital being an international public good, and hence requiring international action, including potentially deserving of Global Environmental Facility funds (Izac 1997). According to an ICRAF researcher:

For soil fertility replenishment the costs are beyond the individual farmer. You have to think about future generations. If it’s degraded today then there will be less for tomorrow. So we need cost-sharing.

¹⁶ See, for example, World Bank (1996:3); IFA (1998); Borlaug and Dowswell (1995). See also, Bumb and Baanante (1996a) and (1996b).

¹⁷ For statements of this position see Borlaug and Dowswell (1995); IFA (1998); Quiñones *et al.* (1997).

¹⁸ Different organisations tend to emphasise the importance of external inputs to different degrees. Some, such as IFDC and Sasakawa-Global 2000, are strong advocates of inorganic fertilisers, while others, such as the Association for Better Land Husbandry, emphasise an organic approach. These days, most situate themselves within an ‘integrated nutrient management’ approach. This apparent consensus, though, hides some varied interpretations. That there are distinctly different interpretations of what the SFI entails was made clear by a manager in the FAO: ‘many interpret the SFI as fertiliser alone ... but blanket application of fertiliser is not recapitalisation’

Subsidy is a bad word, but who should pay the cost? He's doing it [investing in land husbandry] for the benefit of future generations.

Of course not everyone involved with the SFI is committed to exactly the same diagnosis and prescription. One FAO manager, for example, was quite sceptical about the approach adopted by some and argued, for example, that: 'an exclusive focus on yields is very misplaced. The issue is mitigating risk not maximising yield'. However, whatever the caveats expressed by particular individuals, a broad story-line about soil fertility is discernible in the SFI literature, in related academic and other publications, and in turn, emerged forcefully during interviews with key figures involved. It is precisely the simplicity and the starkness of the narrative we would argue that explains its purchase and the very effective creation of soil fertility as a global issue requiring global management.

The subsequent sections of the paper attempt to explain how this happened, examining the issue as emerging from particular scientific practices, individual actions and bureaucratic settings. We begin by examining the scientific creation of soil fertility as a policy problem.

4. CONSTRUCTING FACTS: THE EMERGENCE OF A SCIENTIFIC CASE

This section explores how science and scientific practices have helped to frame a soil fertility crisis and have also helped to provide potential solutions. We begin by examining how science has contributed to the framing of the problem. The introductory chapter of a recent and widely-circulated special publication of the Bulletin of the American Soil Science Society on soil fertility announces:

The magnitude of nutrient depletion in Africa's land is enormous. Calculation's from Smaling's seminal work indicate that an average of 660 kg N ha⁻¹, 75 kg P ha⁻¹, and 450 kg K ha⁻¹ during the last 30 years has been lost from about 200 million ha of cultivated land in 37 African countries, excluding South Africa (Sanchez *et al.* 1997: 4).¹⁹

The concept note for the Soil Fertility Initiative makes use of similar figures, as we shall see, and also makes statements on the degree of African land degradation:

It is estimated that 320 million hectares of vegetated lands have been degraded over the past several decades in SSA. In terms of magnitude, this estimate is larger than the 213 million ha of presently cultivated lands in SSA. Presently, about 26 per cent of the dryland areas suffer from varying degrees of soil degradation (World Bank 1996: 2).

¹⁹ Sanchez *et al.* go on to argue that: 'Africa is now losing 4.4 million t N, 0.5m t P, 3 million t K every year from its cultivated land. These rates are several times higher than Africa's annual fertilizer consumption, excluding South Africa – 0.8m t N, 0.26m t P, and 0.2m t K' [FAO, 1995] (Sanchez *et al.* 1997: 4).

These alarming statistics are cited in many places in the literature on natural resources, land and soils in Africa.²⁰ The nutrient budget figures derive – as the quotation notes – from ‘Smaling’s seminal work’ for the FAO (Stoorvogel and Smaling 1990).²¹ The land degradation data derives from GLASOD soil degradation maps produced by the International Soils Reference and Information Centre (ISRIC) (Oldeman and Hakkeling 1990). Both pieces of work have helped shape the soil fertility narrative set out above in significant ways. No international publication on soil fertility issues would be complete without some reference to either (or usually) both.²² Soil maps with large areas in red (indicating nutrient deficits or land degradation) sit on the walls of policy-makers – as we observed during many of our discussions. The dramatic picture presented more often than not goes completely unquestioned: it is assumed that the data, and associated maps, offer scientifically rigorous and precise knowledge about the world.

Yet in both cases they represent, in fact, highly contingent knowledge claims, as the authors were at pains to point out to us. There is sometimes bewilderment about how data achieves such grand status. One of the soil scientists working on one of these studies commented: ‘when we wrote it we added umpteen footnotes and qualifications which seemed to get lost as the figures were taken up’. The aggregated Africa-wide nutrient balance figures were based on extrapolations from a limited amount of work carried out in small areas of a few African countries. With such heroic assumptions required, they were seen at the time as only rough estimates.²³ Smaling *et al.* (1997: 50–52) comment on the nutrient balance studies:

The studies were often done at the mini-plot level, the results of which cannot be linearly scaled up to the watershed ...The subcontinental scale and uneven data implicitly brought about a considerable amount of generalization, simplification and aggregation.²⁴

The GLASOD study was based on estimates from scientists in a wider range of countries using measurements of top-soil loss. Again there are the same methodological problems of extrapolation, and

²⁰ See also UNEP’s Global Environmental Outlook. ‘An estimated 500 million hectares of agricultural land [in Africa] have been affected by soil degradation since about 1950, including as much as 65 per cent of agricultural land’ (UNEP 1999). <http://www.unep.org/geo2000/english/0053.htm>

²¹ Smaling himself claims: ‘The average N, P, K balances for Africa were –22, –2.5, and –15 kg ha per year respectively... the implication of the figure is that on average Africa must supply 22 kg ha per year to balance the ledger, leading to a decline of the N stocks’ (Smaling *et al.* 1997: 50). A more recent nutrient balance study has been carried out by Henao and Baanante, for IFDC (1999). The figures they produce are found in the widely-circulated IFPRI ‘World Food Prospects’ report: ‘About 86 per cent of the countries in Africa show negative balances of nutrients greater than 30 kilograms of NPK per hectare per year’ (Pinstrup-Andersen *et al.* 1999: 25).

²² See for example, the key technical paper for the SFI produced by De Alwis (1996: 3 and 5).

²³ A nutrient budget is a balance of five nutrient input and five nutrient output functions. The input functions are mineral fertilisers, organic inputs, atmospheric deposition, biological nitrogen fixation and sedimentation. The output functions are harvested products, crop residue removal, solute leaching, gaseous losses and run-off and erosion.

²⁴ The degree of uncertainty and necessary ‘black-boxing’ to create the nutrient balance data is discussed explicitly by Smaling *et al.*: ‘The amount of data available to calculate the five inputs and the five outputs varied largely between and within countries. As a consequence, much available detail had to be dropped and discrete ratings developed for variables that normally represent a continuum. Quantitative information on atmospheric deposition, leaching, and gaseous losses was very scarce. Instead of going by educated guesses, transfer functions were built... in which nutrient flow is explained by parameters that are easy to measure’ (Smaling *et al.* 1997: 49).

much of the constitutive data is of the 'best guess' variety.²⁵ A lead researcher in the ISRIC work commented in a discussion of the soil maps:

Previous soil maps were beautiful wallpaper but they weren't used. People want relevant things. Soils in themselves are not a sexy subject. GLASOD was a wake-up call. But definitely not a product of the highest scientific standards. It was the best available at the time.

Despite the recognition of limitations in these studies by their creators, such works can and do achieve an unchallenged status.²⁶ They get used as evidence in documents seeking to raise funds and support for projects and programmes, and quoted in newspapers to substantiate a particular case, or to create opinion. On occasion the figures change, and details as to their original provenance are lost.²⁷

When figures have a respected organisation's name attached to them it can add to perceptions of their trustworthiness. FAO statistics in particular – be it on forests, agricultural production or the status of soils – can create this aura for some. A consultant working with the SFI, apparently unaware of the widespread critique of FAO yearbook statistics, put it quite straightforwardly: 'The FAO says 83 per cent of land is degraded. Surely we must take the FAO seriously?'

So we can see how this type of data can suddenly find a life of its own and how it can become authoritative through association with particular organisations. But why does this type of data come about in the first place? First there is a demand issue. As a World Bank staffer, working on the SFI, argued reflecting on the difficulty of making the case to his superiors: 'We need more data and more ammunition'. In various interviews, in a range of organisations, and at a range of different scales, it was put to us that figures – particularly aggregated national or international data, percentage assessments or dollar values – can help when it comes to persuading and making a case. In one instance someone even commented that it did not really matter if the data used in a presentation were spurious as the chances were nobody would notice and he would 'win' the argument.

Of course part of the appeal of this type of quantitative information lies in the fact that it is well-adapted for the needs of those making policy decisions, especially those who want information that is translatable into the language of economic planning. Both the soil maps and nutrient balance information were created at the behest of global bureaucracies; the ISRIC data for the UNCED conference, and the nutrient balance studies for the FAO. As one of those working in the field put it: 'they appeal to those who want to turn soil maps into productivity maps'. It is a small step to add monetary values to the figures. Thus,

²⁵ Various other studies or projects exist offering aggregated information on land status for large areas. The Land Quality Indicators project, for example, funded by UNEP and the World Bank (Pieri *et al.* 1995) presents data on pressures on, and the state of land at sub-continental scales: semi-humid or dry areas of Africa, for example.

²⁶ For further discussion of the limitations of nutrient budget studies, see also Budelman and Defoer (forthcoming) and Scoones and Toulmin (1999).

²⁷ Take, for example, the nutrient budget figures quoted above. They appear again in the Concept Note for the SFI. They have changed slightly and this time they are unacknowledged. The impression might be given to an observer that these are World Bank figures: '700 kg of nitrogen, 100 kg of phosphorus, and 450 kg of potassium per ha are claimed to have been exported from over 100 million ha of cultivated land in sub-Saharan Africa over 30 years, resulting in "soil mining" over wide areas with large negative nutrient balances the consequence' (World Bank 1996: 3).

based on the Africa-wide nutrient balance analysis, IFDC researchers show how estimated net annual losses of nutrients across sub-Saharan Africa ‘represents a total loss of US\$ 1.5 billion per year in terms of the costs of nutrients as fertilisers’ (Henao and Baanante 1999: 2). Similar translations into annual loss farm income are made for Mali in a study that has again been widely cited by policy-makers (Van der Pol 1992).²⁸

Such unequivocal statements are often required by policy-making. As a scientist in the World Bank commented: ‘Nutrient balances raise awareness. They are a red lamp.’ By selling a simple message you create an audience, you may acquire funding commitments, and this, it is argued, creates the required space to work on the details, uncertainties and complexities. One researcher noted in similar vein: ‘the role of nutrient balances is large scale awareness, at a smaller scale there is more sensitivity and accuracy’. As an international soil scientist observed:

Nutrient budgets were successful because they were simple, the message was simple ... you can’t take money out of the bank without putting something in. The principle of mining is understood by everybody. Mining leads to lower yields that’s clear. But in the details its not so simple.

However, it is too simple to say that this globalised knowledge effectively arrives from a more or less explicit process of trading between those who perceive themselves to be alternatively in the worlds of policy or science. It also arises from specific institutional locales and practices and so carries sets of commitments reflective of a particular social and political order.

So where has the knowledge informing globalised discourses on soil fertility emerged from? What is striking when one looks at international science is the dominance of Dutch soil science. Many of the key figures are Dutch – de Wit, Breman, Smaling – and the two key studies highlighted above were the work of Dutch scientists, all based at Wageningen. One researcher noted: ‘the Dutch have always been good on a particular kind of applied science.’ Others argued that Dutch soil land survey approaches, the production ecology school founded by De Wit and the Dutch mineral bookkeeping tradition have shaped current approaches in significant ways. Donor support from the Netherlands is also evident for fertiliser importation, rock phosphate programmes in West Africa, technical support for soil management projects in Kenya and Mali, and the IFDC in Togo. In various ways, as we shall see, each of these has been key parts of the soil fertility story in Africa. Thus what may at first appear to be global science and policy is rooted in much more local, historically embedded practices.

4.1 Dealing with complexity and uncertainty: the anatomy of a scientific dispute

Through the language of ‘balancing the books’, of inputs and outputs, drawing down capital stocks, creating deficits and so on, discursive commonalities between the worlds of science, planning and policy-making are created. Sanchez *et al.* (1997: 11) argue that: ‘there is an exact congruence between the concepts of capital

²⁸ See Scoones and Toulmin (1999) for further discussion of these.

stocks and service flows in economics and that of nutrient pools and fluxes in soil science'.²⁹ However in making these discursive linkages important complexities and uncertainties are often hidden from view, and ambiguities introduced. One scientist commented: 'People say you never get a straight answer from a scientist. Next year they say, and next year never comes. They are right'. Nor does such data uncontroversially lead to a strategy for action. Another scientist observed: 'Nutrient budgets don't tell you what should be done. NPK may be being mined, but that doesn't mean there is a deficit or it's limiting yields. It may be that soil organic matter is the problem'.

The 'black-boxing' of uncertainties – where key assumptions are removed from further discussion (Latour 1987) – is part of regular scientific practice. According to an ICRAF soil scientist: 'closure depends on the magnitude of the question. It comes down to how comfortable you are making strong statements. And it depends on your audience – whether its an academic journal or the annual report of the institute'. But critically closure allows you to do other things: 'we need the bigger picture, then we go down to villages and farms'. But ambiguities and uncertainties are not only the stuff of aggregate models with multiple assumptions. Scientists not only produce contingent knowledge when they address the 'bigger picture', but also when they produce technologies and recommendations, and 'go down to villages and farms'.

In some commentators' eyes, the SFI grew out of plans in the mid-1990s for a Rock Phosphate Initiative (RPI), a plan to recapitalise soils through massive one-off applications of phosphate rock (World Bank *et al.* 1994). This raised a range of technical issues centred on the relative importance of phosphorous or nitrogen as nutrients, and questions surrounding the balance between mineral and organic applications, as well as economic issues surrounding feasibility. Attempts to integrate rock phosphate applications and more organic approaches also emerged, prompting new work on improved fallows and green manuring by ICRAF and partners using a range of 'wonder plants' such as *Tithonia* and *Sesbania* (among others). The benefits of this apparent win-win technical solution was presented in a discussion with a senior researcher in ICRAF:

N is biological – it can be taken care of through improved fallow. So the old argument that such nutrients are too bulky to transport disappears. You can get 100–200 kg of N per hectare, an amount any European farmer would respect, labour may be a problem of course. P won't work biologically – TSP is OK, but why not use local rock phosphate – some is very high quality. Minjingu melts in the soil, it's lovely, the best you can get ... an investment of 250 kg of PR once every 5 or 10 years is best. Little by little is just not as good ... now we need to convince the donors to invest.

However, there are substantial doubts within the soil science community about the efficacy of large-scale applications of phosphorus, and the soundness of the science used to justify such an approach. One scientist complained of the lack of 'scientifically sound reasons to advocate large inputs of rock P. We need real data on the real effects of rock P and soluble P', he said. In an attempt to resolve some of this debate,

²⁹ Sanchez *et al.* continue: 'The above-defined nutrient capital stocks as discrete pools fit well with economic concepts. Nutrient fluxes during the growing period are synonymous to service flows in economics. Such fluxes subtract from the nutrient capital and are thus analogous to the concept of depreciation' (1997: 11).

experiments were run looking at different dose rates. To many, the results of these trials were inconclusive, but a decision was eventually made to proceed with pilot work in western Kenya.

What was key to this decision – discussions revealed – was that well-positioned scientists within the organisation were convinced of the case and were able to carry the argument, despite the doubts of other colleagues. A key factor here was that a country task manager with a technical background in the World Bank was himself convinced and presented the opportunity of developing a funded project. He commented to us that despite the uncertainties there was no fundamental problem. Uncertainties could be dealt with as they went along:

How to make rock phosphate more soluble is the key issue in ICRAF. They are reluctant to release it before they are sure. I say we should look for a solution while we are expanding. Scientists want to know why, but if the results don't do any harm then so what. This is development!

Another ICRAF scientist argued the case for an adaptive approach, where recommendations are refined in the light of ongoing results:

We need to understand why things do and don't work ... we get feedback from development saying what the needs are, and then science tries to provide the information...for example with the west Kenya pilot project. Scientists create options, what sort of things might be suitable for different conditions... For example, *Mucuna* in some places will work, in some it won't, and in some it will be terrible.

But others would not accept this logic, arguing that moving along iteratively was all very well in principle, but if there were fundamental doubts among peers about the wisdom of the path advocated, then substantial investments could be very misplaced:

You have to think about the costs to the tax-payer. The experiments only ran for two years and really you needed much longer. Other things could have explained the response. The best use of public money for soil fertility is to build roads. Farmers will do it themselves if there are markets and good infrastructure.

Organisational – and particularly funding – imperatives often drive the agenda. Magic bullets and big ideas have much appeal. While the whole approach of looking for a single solution was regularly scorned by our informants, the rationale for such an approach was also widely appreciated. One scientist, while sceptical of the technical merits of rock phosphate recapitalisation noted: 'I don't believe in one-off recapitalisation. It's logistically impractical for one thing ... but modest things get no money'.

Thus, while there are often uncertainties and disputes around the scientific efficacy of particular solutions, there are also debates about the principles upon which decisions to move ahead should be taken. For some, you do nothing until you are sure; for others you move ahead cautiously; and for still others scientific recommendations need to be looked at in a broader perspective looking at social and political factors and possible consequences, as well as economic opportunity costs. Values, risks and uncertainties,

though not often directly addressed, are key parts of science in practice. Science therefore begins to look much more contingent, and much more bound up with institutional practices and organisational or political realities. What actually happens, whether a problem definition, or an offered solution, moves to a position of influence can amount to whether well-located actors take things up and put their weight behind them. Individuals in key organisations publicising data, for example, or a project manager deciding to move ahead and invest in a technology. The centrality of these networks of actors to the development of the SFI is the theme of the next section.

5. EXTENDING THE IDEAS: THE CREATION OF ACTOR-NETWORKS

For some scientists we spoke to science was assumed to influence policy in a rather linear fashion. Knowledge was produced, and then offered to policy-makers who then decide on appropriate courses of action: ‘we develop expertise and let policy-makers know the costs and benefits over 20 year projections, consequences of different policies, enabling policy-makers to make comparisons of different scenarios’.

This view is, however, problematic. It may be part of the story, but there is also reason to believe that scientists interact with policy-makers in many different ways, and at many junctures. In this process dominant narratives are created and maintained. Looked at this way, policy should not be understood as part of a process of ‘speaking truth to power’, as some models of policy-making assume.³⁰ As this section will argue, policies emerge instead through the interacting situated practices of scientists and policy-makers and through the mutual construction of storylines and the building of networks and coalitions.

The creation of actor-networks can be understood as a process of building ever-thickening webs that run between the supposedly distinct realms of science and policy, building hybrids of ‘fact’ and ‘value’, and so creating knowledge in action (Latour 1993, 1999). Examination of the building of such networks is essential to understanding the development of soil fertility a global policy problem, and the development and subsequent fate of the SFI. Evidence for these networks can be found in the references people make to each other in conversations, in publications, in reference lists that suggest a shared vision, or a commitment to certain norms.

Networks are built through a variety of overlapping means: periods of shared study, being taught by the same people, working in the same organisations, attending conferences, workshops and seminars, being on advisory committees, working on joint projects, cooperating on funding proposals, serving on funding committees, journal editorial boards, acting as referees and so on. These often overlooked social practices – which are often seen as rather irrelevant to the seemingly more substantive issues of making decisions or doing research – are actually highly constitutive in building a paradigm or a discipline (cf. Latour and Woolgar 1979; Knorr-Cetina 1999).

So, for example, many prominent technical scientists engaged in international work in soil science have studied together at Wageningen in the Netherlands, Montpellier in France, Reading or Wye in the UK, and

³⁰ The scientific advisory committee model is a key example, where experts are called into offer advice on specific issues, or to ‘do the science’, and offer accredited knowledge about any given subject.

Cornell in the USA, carrying with them particular commitments to styles of science, as well as networks of contacts. Professional meetings are also a key part of international networking. For instance, the World Congress of Soil Science or meetings of the Soil Science Society of America may be critical events where networks are formed, extended and reinforced.³¹ Certain journals – such as the Soil Science Society of America Journal – may also be key routes for exchange, as well as certain email discussion groups or web based interactions. Funding sources also often bind groups of people together. For example, the investments by the Rockefeller Foundation in eastern and southern Africa have been important in linking national agricultural research scientists with international actors, based in universities or the CGIAR system.³²

Through these networks norms of good and bad practice are reinforced, research agendas are set, and orthodoxies or conventional wisdoms are reiterated and, very often, dissenting opinions or unconventional views are suppressed. Such networks also work to advance the interests of an overall field. Hence, even while people may look askance at the Smaling and Stoorvogel data in one respect, they also see it as a good thing more generally, because raising the profile of soil science and particularly of soil fertility is important, and perhaps can also benefit everybody in the field.

To reach further and to extend to other spheres networks require actors who are protagonists, or ‘policy entrepreneurs’ as they are labelled in the literature (Kingdon 1984). To those who know the field it is clear that there are several characters in the soil fertility world who have plenty of charisma, vision and a good strategic sense. As one FAO informant wryly labelled them: ‘the zealots’. These figures can play crucial roles in publicising an issue, succinctly defining the urgency of a problem, and offering the possibility of solutions that are within reach. In a world of complexity, where multiple issues compete for attention this ability to distil a clear, simple and pressing narrative should not be underestimated.

Henk Breman’s ability to strikingly suggest in the 1980s that the problem of the Sahel was one primarily of fertility, rather than, as was conventionally assumed, lack of water, is an example of a sound-bite approach that was immensely challenging because of its sheer directness. And it came along with a solution again graphically communicated: publicity posters of bags of fertiliser being dropped from a plane over the Sahel.³³ This ability to communicate should not be underestimated; and imaginative figures committed to having an impact in the public domain have been central to the highlighting of soil fertility issues in the international arena. Champions are important. As one senior researcher commented: ‘Professor de Wit started all this in the 1970s. These were his ideas. I wish I’d worked with him. I love that man’.

These ‘policy entrepreneurs’ clearly communicate and publicise effectively. But not only that. They are also often excellent strategic players, who know how to persuade, or even cajole, where to exert leverage, when the time is right to make a push and exactly who to target to extend influence and how. Latour refers to these processes as ‘enrolling’, extending the power and reach of an actor-network by bringing more

³¹ For example, the Bulletin of the Soil Science Society of America publication by Sanchez *et al.* (1997), following a key meeting in Indianapolis in 1996. Also, the 16th World Congress in Montpellier where the idea for a Soils Convention emerged.

³² For example SoilFertNet is coordinated by CIMMYT in Harare and involves research scientists from Zimbabwe and Malawi, with support from a senior soil scientist seconded from a UK university.

³³ See Penning de Vries and Djitéye (1982) for the scientific overview of the project, and Breman and Uithol (1984) for a summary with publicity materials.

individuals into its ambit. Strategising is key, using connections to push a point, identifying people who can in turn use their links to others.

5.1 Creating a global network: the origins of the SFI

These processes of network extension were key to the launch of the SFI and the initial splash it made. One informant explained how he saw the development of the SFI:

The SFI started here. Three years ago we took policy-makers to the field and that's when it really took off. A key player was Bob Blake [Ambassador Robert Blake, chair of the Committee on Agricultural Sustainability for Developing Countries an influential NGO lobby group based in Washington DC]. He is an old friend, he said when you've got something call me. He came to Zambia 3 months later and saw [the improved fallow experiments] and raised holy hell. He saw Wolfensohn [President of the World Bank], and we got the concept note of the SFI.

Blake returned to Washington and wrote an impassioned and detailed twenty page letter to Wolfensohn³⁴. Wolfensohn called in a range of advisors to help draft a reply.³⁵ Shortly afterwards, at a critical stage in the Bank's rethinking of its rural development strategy and support for Africa he started adding soil fertility as a key issue to his speeches. In his October 13, 1995 reply to Blake he observed:

Your letter provides many valuable insights and solutions aimed at revitalizing agriculture in African countries by restoring soil fertility and increasing agricultural productivity. Based on our experience in the region, we agree with your assessment that continuous mining of soil nutrients throughout Africa has contributed to lower crop productivity and slow agricultural growth. Without restoration of soil fertility, Africa faces the prospect of serious food imbalances and widespread malnutrition. It is therefore important that African countries implement actions involving stakeholders at both the local and national levels.

The capturing of some key players of the Washington policy elite was certainly seen as indicating a significant expansion of the soil fertility actor-network. Meanwhile, other more junior officials in the Bank had similarly been working to raise the issue, and had produced notes documenting the alarming nature of the soil fertility problem, and using the studies and figures discussed above (World Bank 1996). These things were key to what one World Bank staffer called the 'first phase' of the SFI: 'The first phase was to put the issue on the agenda and it worked quite well. Johnson the Environmentally and Socially Sustainable Development Vice-President came on board, and then 'the Pope' – Wolfensohn'.

The World Food Summit likewise provided an excellent opportunity for those with a vision for global action on soil fertility. Officials in FAO suggested they had also played a key role lobbying the Bank: 'We [in FAO] managed to convince the technical people in the Bank that our solutions were sufficiently

³⁴ Robert Blake's 'open letter' of 8 May 1995, is reproduced, in part, in *Fertilizers and Agriculture*, November 1995 (IFA 1995).

³⁵ Wolfensohn's reply (October 13, 1995) is reproduced in full in *Fertilizers and Agriculture*, March 1996 (IFA 1996).

sophisticated'.³⁶ Links were then made to Diouf, the director of FAO, and a formal launch took place at this high-profile international summit. With the launch, a glossy brochure was put out with a forward by Serageldin of the World Bank, and with individual sheets for key organisations deemed part of the formal initiative, including ICRAF, IFA, IFDC, the World Bank, FAO, IFPRI and USAID (FAO *et al.* 1996). Each gave details as to why they were committed to soil fertility and what they were doing. The effect was to give the impression that a global actor-network had been created incorporating a UN body, CGIAR centres, the major international development bank, a key bilateral and the fertiliser industry.

In 1997, a year after the World Food Summit, there was a major international meeting on the SFI in Lomé which brought together again all the key players and also potential new partners – largely bilateral donors. A very impressive actor-network of global reach had been constructed. Facts had been extended, a new global policy problem had been created, important people were interested and had lent their voices, and a new architecture looked to be moving into place to address the problem.

5.2 Linking the global and the local

But these tactics of building networks and enrolling actors were not only being used to construct an international coalition, and so a soil fertility initiative with capital letters, they were also being used to build critical networks in particular countries, linking global processes to the local. A researcher in ICRAF presented his interpretation as to how a concern with soil fertility took off in Kenya:

We took the Dutch Ambassador and the assistant Minister of Foreign Affairs to the field to see what was going on ... On the way back he was travelling next to the Minister of Finance and one of our troops was in the backseat, and he overheard him say you have phosphate and it caught his interest, now its in the Ministry of Agriculture.

Again persuasion, contacts, making opportunities and showing people things –processes of construction – were key. The use of the word ‘troops’ also suggests the degree to which the researcher views his work as a type of campaign. He went on to indicate how the process went further when a newly enrolled member of the network caught something of the vision and went about engaging other important players:

Cyrus [Cyrus Ndiritu, KARI (Kenyan Agricultural Research Institute) Director] saw one trial. ‘I don’t need to say anything else’, he said, ‘now this is a Kenyan problem, we’ll take the leadership’. Within two months there were seminars in the Ministry of Finance. Cyrus gave a bouquet of tithonia flowers and explained. Kenyans really campaign – soil conservation is still authorised from the president’s office. KARI is now a donor to ICRAF. They put their money where their mouth is.

Having concrete pilot projects, backed by local advocates, has been an important strategy in many of the NGO attempts to influence policy in this field. Perhaps the most successful in this regard has been the

³⁶ Interestingly slightly different emphases are placed by different actors on different networks and correspondingly on who did the key bits of enrolling. This can be seen to some extent - as we shall see in the next section – as different organisations claiming ownership.

Sasakawa-Global 2000 programme. In many respects this organisation is peculiar in that it has access to exceptionally good connections. Two of the most key players are ex-US President Jimmy Carter and Norman Borlaug, the Nobel Laureate who was a significant player in the 1960s Green Revolution in Asia. Through these connections links between the global and the national are made. Thus direct access to senior officials in the World Bank and African Presidents is no problem. For example, President Meles Zenawi of Ethiopia has been a strong supporter of the programme, as has Ed Jaycox former Bank Vice-President, both appearing on publicity videos for the NGO (Sasakawa Africa Association 1996). While many do not necessarily agree with all that SG2000 do, no-one questions their effectiveness at influencing policy in a number of countries. As one commentator put it: 'SG2000 are effective lobbyists, pushing and kicking, they come and knock on the door'.

The local advocates so effectively mobilised by SG2000 in Ethiopia – ranging from the President to the farmers of Shashemane – provide a degree of legitimacy for the programme. While often talk remains at a rhetorical level, much is made these days of the need to demonstrate a 'demand-led' approach to development, with local 'stakeholders' and building development programmes on the basis of 'partnership' and 'participation'. Enrolling farmers in the actor-network is therefore an important part of the strategy. Across Africa farmers are involved in development projects which are used as pilots to make a broader policy point. Whether it is the *Tithonia* and *Sesbania* growers working with ICRAF in Eastern Zambia or the farmers of Ethiopia applying the SG-2000 fertiliser/seed package in Ethiopia, all are important to the wider actor-network. The visits of Wolfensohn to Zambia or Meles Zenawi to Shashemane have been seen to be key in significant policy shifts within the World Bank and the Ethiopian government respectively. The Director General of ICRAF was at pains to point out how their highly technical work on soils and agroforestry was based on local demand: 'Soil fertility came up as an issue. Farmers told us soil fertility is a problem. We transfer farmers' participatory diagnosis into hard science'. But who are these farmers? It is important for the stability of the actor-network to have farmers who are 'on-message'. There is nothing worse than a ministerial visit where the 'wrong' message comes across. Farmers and pilot project sites are thus often carefully selected such that success can be guaranteed. Participation in terms of the technologies to be tested or the management techniques to be applied is usually highly constrained.

Actor-networks of course need maintenance. You can enrol senior influential people for a period but it is not necessarily easy to maintain their interest, or support in a way that is effective. Likewise you can build a coalition, of the type listed in the SFI publicity brochure, but you also have to keep those actors there acting in concert, committed to a core project. Too much dissent or excessive compromise can only act to dilute the message and dissipate the network. Finally, any global actor-network needs links to localities – to the national level and below. A global initiative with no roots may be hard to sustain. Actor-networks around international organisations must therefore move across many scales. Not only do key figures in the institution live in a hybrid world of science and policy, and in a world that blurs the lines between scientific

experiment and practical application, but they must also assist in localising a global discourse and globalising local discourses.³⁷

6. BUREAUCRATIC POLITICS: INTER AND INTRA-ORGANISATIONAL DYNAMICS

Having identified the centrality of actor-networks to an understanding of the creation of a soil fertility problem, the globalisation of particular forms of scientific knowledge, and concomitant forms of organisation, and the importance of an understanding of scientific practice, we move to locate science and actor-networks in bureaucratic contexts.

We have seen how scientists have to deal with the tensions of balancing the need for compelling messages with awareness of the limitations of transmitting messages that obscure complexity and uncertainty. We have also seen the importance of constructing actor-networks, and the critical role of individuals in getting the SFI off the ground in the first place. All this takes place against a backdrop of inter- and intra- organisational dynamics. Understanding these bureaucratic settings is key to understanding how a platform for a global initiative was constructed and then moving from conception and launch to planning, and how, later, the initiative in many respects changed shape altogether.

It is worth recalling what exactly the rationale was for a major international initiative. The case was put in a document produced by the FAO Investment Centre in 1996, called 'Recapitalising Africa's Soils'; the second major paper produced for the SFI. De Alwis, the report's author, argued that:

There is a strong case for heightening the awareness and focus on soil management/ regeneration issues, particularly in Africa ... Given the wide range of national and international research institutions concerned with soil management and fertility issues, as well as the bilateral and multilateral donors, NGOs, international agencies and industry institutions involved, a process of collaboration needs to be fostered. The Bank and the FAO are well placed to foster such collaboration with a view to identifying opportunities for investment and policy initiatives, as well as for catalyzing studies, analyses and development assistance directed to upgrading soil productivity and restoring soil health (De Alwis 1996: 23).

In other words, a range of people were doing things, and bringing them together might make the whole bigger than the sum of the parts. As a commentator in the World Bank put it: 'the SFI was a kind of flag'. However, this rather bright view of the virtues of cooperation is only one part of the story. Another commentator suggested there were other factors at work: 'There are agendas of course: institutional survival... bureaucratic agendas are key'.

³⁷ The contingency of these boundaries, and the social nature of the way boundaries are constructed between science and society are discussed in Gieryn (1995). See also Shackley and Wynne (1996), van der Sluijs *et al.* (1998) and Jasanoff (1996).

So what exactly might these bureaucratic agendas have been? Broadly several different types of reason are discernible. For some organisations, with a very specific soils management focus, there is a clear imperative to raise the profile of soil fertility, and importantly, to ensure it has a certain complexion. Others have in a sense redefined part of their core mission as being about soil fertility. Others have joined in, it might be argued, because organisations' global mandates require international initiatives and soil fertility stood the chance of becoming the basis for one.³⁸ For still others soil fertility was never going to become a defining issue central to their organisation. In these cases though, through the work of highly committed internal protagonists, a focus on soil fertility for work on agricultural and natural resource management issues in Africa fulfilled a certain organisational need for rallying points and flagship themes.

In this section we look at a number of the key organisational players linked to the SFI. We begin with organisations with very specific objectives. IFDC, for example, has as part of its mandate the promotion and improvement of fertiliser use, and the Africa wing, based in Togo, of this US-based international organisation, has a strong interest in Africa wide initiatives.³⁹ A close alliance with industry players was necessary for IFDC given its focussed interest in fertiliser supply issues. This was particularly evident through the Paris-based IFA, a body which represents industry interests and, at least in the early stages, was very much linked in with SFI efforts.⁴⁰

Fertiliser use in Africa is obviously tiny when viewed globally, and even smaller than it once was, given the removal of subsidies as part of Structural Adjustment Programmes. However, it is now viewed by some as one of the significantly expanding markets, albeit from a small base. Particularly given the fact that many previously key markets may now be shrinking for reasons such as subsidy withdrawal and environmental regulation. A sense was expressed by some we spoke to in the industry that, with logistical and infrastructural improvements, and even comparatively simple marketing innovations, such as selling fertiliser in smaller packs and with a more diverse range of combinations of nutrients on offer, scope for significant expansion might exist in some places.

Discussions also revealed that agrochemical transnationals such as Norsk Hydro had been busy acquiring shares in the limited number of national companies that exist on the continent, were involved with discussions about the development of new fertiliser factories linked to the SFI, and generally were expressing a strategic interest in the continent, or at least particular parts of it. Evidence of this can also be seen in the development of an Agribusiness Forum for Africa, coordinated by SG-2000, and involving seed companies such as Novartis, Cargill and Monsanto, and fertiliser producers such as Hydrochem. Given the World Bank's long running interest in fertiliser supply projects, it is no surprise that they too have been involved in this forum (Sasakawa Africa Association 1998).

³⁸ This is not to deny that there are not individuals with a high degree of conviction and commitment in any of these organisations.

³⁹ IFDC, 1996; www.ifdc.org.

⁴⁰ The IFA is one of the seven founding organisations represented in the glossy publicity material for the Soil Fertility Initiative. The IFA magazine *Fertilizers and Agriculture* also publicised the important correspondence between Robert Blake and James Wolfensohn (November 1995 and March 1996 issues).

For a CGIAR centre like ICRAF there is also an institutional mandate. Under the directorship of Pedro Sanchez, author of key texts on soil fertility, it is possible to identify a slight shift in the focus of the organisation, or a clearer articulation of the selling points of agroforestry – which is where improved soil fertility comes in.⁴¹ In recent years all CGIAR organisations have been under financial pressure as donor commitments have declined. This in turn puts them under pressure to make the case for their relevance at the international level. Clearly, where one can define one's work as central to a potentially big international theme there is a strong attraction.

The same pressures apply to the FAO.⁴² There is substantial debate within the development community, and further afield, as to what exactly the role of the UN technical agencies should be, and for some even whether they should exist at all (Imber 1996). From our discussions there seems to be something of an impasse currently: people are really not sure what is the value of these still very large bodies – despite restructuring in recent years. But equally many are reluctant to be seen to articulate openly a line associated with isolationist US Senators: namely, some form of dissolution.

We asked a senior regional FAO official what exactly he saw the comparative advantage of the FAO as being. He went quiet and fidgeted for an awkward length of time and finally said 'I know what I'd like to answer to that question'. His frustration was echoed by the rather jaded comments of a range of similar individuals in Rome and elsewhere, who had come into the organisation often two or three decades previously when there was a definite role for their technical skills. Now, in a more devolved role where transfer of technology paradigms are broadly discredited, the sense – to outsiders at least – of trying to find something to do, or just shuffling paper until retirement is palpable.

The only growing part of FAO is the relatively new Sustainable Development Department. Charged with doing strategic thinking and being more policy focussed, this department exists in tension with the older technical departments such as Agriculture, as many made clear to us. One official noted: 'the Sustainable Development Department and the Agriculture Department are conflicting ... it's a case of who shouts loudest'. A close external observer commented on the resentment this 'shiny' new department had generated: 'they are viewed as interlopers by the old guard'. There is a sense that 'FAO will finally be reduced to an information centre talking and thinking about strategies'. This division between talking and managing things is crucial. Organisations can either spend or loan money, manage projects, and offer tailored technical advice, or they can live in the world of words and ideas: 'development guff', as a manager in the World Bank put it to us observing the same tension in his own organisation.

In FAO, the technical sections appear to be losing out, and the role of FAO in the SFI can be understood in this light. The Agriculture Department, and in this case, the land and Plant Nutrition Management Service within the large Land and Water Division, incorporating the former Fertiliser section, has many technical people needing to be used.⁴³ Likewise the Investment Centre needs projects, and staff are

⁴¹ www.icraf.org; Presentation of ICRAF's work on soil fertility can be found at <http://www.cgiar.org/icraf/inform/CorpReport.htm>.

⁴² www.fao.org; for an organisational analysis of FAO in relation to forestry, see Brechin (1997).

⁴³ The Fertiliser section became the Plant Nutrition Service, and this service has recently been merged with the Land Management service.

particularly reliant on consultancy operations commissioned through trust fund arrangements with the World Bank. Although these groups can move into the strategic ideas stratosphere, and there is an element of this to the SFI, they ultimately need technical projects with an international dimension – hence the critical appeal of the SFI to particular parts of FAO looking for a role.

By contrast, the World Bank – not even large sections of it, as with FAO – does not have a significant bureaucratic interest in the SFI. Particular individuals may be extremely interested, especially when restructuring threatens jobs and empires. For example in the mid-90s when the Africa region section was being overhauled, one insider recalled: ‘jobs were on the line at the World Bank ...so the memo [from Wolfensohn] gave an opportunity to X’. However, as an issue of institutional survival or expansion, it is not essential other than as one of many mobilising themes articulated to the larger development community.

In a later section we will return to the World Bank and FAO and look in more detail at their internal bureaucratic procedures and ways of working in order to gain insights as to the progress (or otherwise) of the SFI. At this point, however, it is useful to bring the SFI story up to date and explain its progress and mutations in terms of the institutional machinations of bureaucratic politics and the associated shifts in actor-networks.

6.1 Institutional mandates, bureaucratic politics and the SFI

The SFI began, as we have shown, with some lobbying of key people, the preparation of some concept notes and technical papers which publicised work in soil science on the magnitude of the problem. In the meantime scientists and economists in different organisations had been looking at rock phosphate as one solution to the perceived crisis of African soils. There was an international launch at the World Food Summit in 1996, and, in the following year, a gathering of a network of interested people in Lomé. Up to this point – with such influential scientific and bureaucratic support – it looked like the SFI would run as a major international initiative. However, by the next international meeting in Rome in 1998 when donors were assembled in an attempt to get significant financial pledges, things were appearing to falter. By late 1999, talk was far less grand and something far smaller was being discussed or, depending on how you look at it, nothing at all. As someone commented when we explained this research: ‘your introduction and conclusion must be that the SFI is going nowhere’. So what happened? One comment made after the Rome meeting was that there had been a significant shift in thinking away from the ‘phosphate and inorganic fertiliser large scale input agenda’ towards ‘locally driven, farmer initiated and funded interventions reflecting local needs and recognising both diversity and complexity’.

Certainly, while enthusiasm for massive rock phosphate applications continues in particular places – Kenya, Burkina Faso and Mali are examples – the sense that this is the ‘big solution’ as some early discussions suggested and the early proposal for an RPI revealed has diminished significantly. There has even been some backtracking suggesting it was never seen as a large-scale magic bullet anyway. In the period between 1996 and 1998 the scientific black-boxes around rock phosphate were reopened. As a technical person in FAO argued:

SFI started as RPI but that was not practical and was technically unsound. The idea that you throw on rock phosphate as a once and for all public investment is extremely naive.

The publication of a key paper by internationally renowned soil scientists advocating a more circumspect approach to mass phosphate application was, it was claimed, ‘suppressed’. But, despite this, a year or so later (and in the interim through formal email circulation) found an outlet in another book on soil fertility. The apparent closure on the scientific debate (see above) was, in the end, premature, as alternative actor-networks formed bringing key uncertainties back under scrutiny. Although initially actor-networks embraced important people such as Wolfensohn in the final analysis it was not possible to convert this early commitment into sustained support and so the actor-networks became unstable. ‘There are many who could have thrown their weight behind it but haven’t’, was the view of one researcher.

However, this instability needs probing further. There was instability in the science, and, as we have suggested, in the actor-networks, but also crucially within the bureaucratic settings where such networks operate. There are three key points to this. First, there are and were important ‘attitudinal differences’ (to quote another informant) between organisations. Secondly, internal organisational cultures, missions and dynamics have also been key. And third, global initiatives can only exist divorced from ‘localities’ up to a point. The nature of their interactions with smaller scales is two-way and ends up affecting the shape something takes: the global impacts on and shapes the local, but also the local can significantly redirect and recreate the global.

Inter-organisational dynamics takes many forms. One view expressed is that ‘there is one bag of money and we all have to compete’. There is something to this, but it is only part of the story. Industry does not compete for money in the same way as ICRAF, and while elements of the Bank require donor funding, their interactions with donors are rather different to those of IFDC. More salient is that organisations move in different ways and are concerned with different things: ‘organisations will do what they want to do’.

The fertiliser issue is key in this regard. At one level there is absolutely no contradiction between organic and inorganic approaches. Very few people argue exclusively for one or the other. It would be misrepresenting the IFA, IFDC or SG-2000 – all well known for strong support for increasing inorganic fertiliser use – to say they argue only for fertilisers. SG-2000 conduct trials on nitrogen fixing plants, and IFDC and IFA makes much in their literature of ‘integrated plant nutrition solutions’. Indeed, there is a strong argument (put to us by a number of industry players) to say the best way to sell more fertiliser in Africa is to develop other technologies to go with it.⁴⁴ In the end, it is a matter of emphasis. When it comes to the crunch, such emphases matter, as competition may develop, compromises may become difficult to forge, and ultimately, actor-networks may unravel.

The sense of a difference in emphasis is clearly very real to key participants in the initiative. A senior CGIAR researcher commented: ‘the problem with soil fertility is that it gets equated to fertilisers and then in

⁴⁴ The Integrated Plant Nutrition line coming from the IFA may of course be judged by some to be just so much ‘greenwash’ – attempting to appear balanced, moderate and environmentally-friendly to diffuse potential criticisms of the fertiliser lobby.

the next breath to nitrogen ...then it becomes nitrogen fertiliser economic policy'.⁴⁵ Another researcher complained about the role of the IFDC:

IFDC pay lip-service but they are really just working on national fertiliser action plans, using rock phosphate of low-quality. IFDC are trying but they can't do it because they have no organic approach ... the driving force behind Burkina phosphate is not a technical person.

For others the SFI has generally become much less fertiliser oriented. Many in FAO expressed the view that they had been working on a far more organics-led approach, and the fertiliser push often associated with FAO technical advice was part of history. The role of the bilateral donors in failing to come up with the required funds to push the SFI in the way it was envisaged by some was clearly key. Worries that the SFI was too linked to an inorganic fertiliser agenda were expressed. Many such donors are guided by 'sustainable agriculture' strategies and policies which are in turn informed by work on 'farmer first' approaches and low external input sustainable agriculture.⁴⁶ Through the influence of advocates of a more integrated approach to soil fertility management, it became increasingly difficult to hold the position that a 'big bang', 'mega-bucks' soil fertility initiative was the answer. While such approaches are appealing to many donors in terms of the potential for rapid, high profile disbursement of aid money, the qualms about the technical, economic and social consequences were increasingly evident as the debate began to open out. Some of the early supporters of the SFI appear to have distanced themselves from it. For example recent issues of the IFA newsletter have virtually not mentioned the SFI.

The global framing of the soil fertility debate remains contested terrain, making it difficult for a tight, coherent and focussed actor-network to be maintained. Many of the key players have got on with what they were doing, either ignoring the global, laying claim to it, or criticising the shape it is taking. Here the national refraction of global issues may be key, with the fertiliser industry apparently retracting, consciously or not, from an open global positioning, to getting on with particular promising avenues in particular places. Others have focussed geographically, with IFDC, for example, continuing their work in west Africa, while ICRAF continues to work in eastern and parts of southern Africa. In each case the global may have had its place, but the actor-networks constituted at the national and regional level are, in the end, more key.

However, despite this, relationships between organisations remain important. For some in ICRAF, the organisation, who, as we saw above, claimed a key role in raising the issue strategically, these issues are important. There is a sense of being marginalised from something that might have offered the possibility of doing more than just activities in limited places: 'I said to X... you are the father of soil fertility why aren't you

⁴⁵ The Dutch fertiliser industry, for example, funded the publication of a key collection of articles on soil fertility in Africa: van Reuler and Prins (eds) (1993) *The Role of Plant Nutrients for Sustainable Food Crop Production in sub-Saharan Africa*. The volume contains articles by key Dutch soil scientists – Smaling, van der Pol and Janssen. An Ethiopian diplomat writes in the forward: 'therefore I welcome the initiative taken by the Dutch fertiliser industry to invite independent research institutes to examine the relationship between plant nutrients, food production and the environment and to determine the place of fertiliser in sustainable agriculture in Africa'.

⁴⁶ DFID and SIDA, for example, have sustainable agriculture strategies both of which have been informed by consultancies by IIED, based in London. Dutch research institutes, such as ILEIA and ETC, have also played key roles in advocating sustainable agriculture and participatory technology development to donors.

on the scientific advisory committee of the SFI – well he rang up and eventually got on it’. Another senior researcher vented his frustration with the SFI: ‘I can’t go to Rome. They didn’t tell me. They should get out of their bureaucracies in Washington and Rome and come and see what we have been doing. The next meeting should be in Kenya! I’ve told Bob Blake to rattle the cage against bureaucratic inertia’.

This gripe about Washington and Rome, though not an unusual development jibe, is pertinent. Someone else commented, again raising eyes to the heavens: ‘the FAO and World Bank own the SFI – we don’t know what is going on’. Inter-organisational competition between FAO and the World Bank has in many commentators’ eyes been a significant stumbling block. As we have discussed significant sections of the FAO need the SFI – the declining technical departments needing a new role, and the Investment Centre needing technical support mission consultancy funding. Given the funding squeeze at FAO (or, in some people’s view mismanagement combined with diversion of funds to special projects and new high profile departments), these FAO players also need the World Bank and, in particular, the trust funds it holds. Thus, a key factor in explaining the grinding to a halt or transformation of the SFI is the internal workings of these organisations, a subject to which we now turn.

6.2 Internal workings: constraints and opportunities

We begin with FAO. FAO, it can be argued, has a systemic problem – everybody knows there are some excellent people inside, and even a few very good approaches, but the overall perception, and indeed much of the reality, is of a cumbersome bureaucracy beset with politics. Take the acclaimed work on Integrated Pest Management through farmer field schools. One person in the land division commented: ‘TPM began as a clandestine group ... there are now 60,000 farmer field schools, and FAO had to claim their part, but going public could be the kiss of death.’

The sense that many people are political appointments was made repeatedly. People complained of sycophancy, secrecy, and plain wasted experience: ‘the Diouf line’; ‘assistant Director Generals just go along to take their instructions from Diouf’; ‘what will your man do for us? How many projects?’; ‘having a sensible discussion is hard. A lot of people are watched’; ‘people say: “ I have been here for 25 years no-one has ever asked me what I think”’. Recording these comments may seem harsh, but they do – combined with the earlier points – help explain how some of the internal dynamics within FAO may have contributed to some of the inertia around the SFI, and, in addition, they are expressed quite openly by people within the organisation. As someone else within commented, again in relation to the SFI: ‘bilateral X won’t get involved while [FAO official Y] is involved’. There are a lot internal politics, which prevent effective action both inside the organisation, and in cooperation with those outside.

Turning to the World Bank internal dynamics are again central, but in a different though equally systemic way. As with FAO there are schisms in the Bank, particular individuals wield considerable influence, and there are clearly certain task managers, who, for example, see fertilisers as the solution to everything,

while others advocate more multi-faceted approaches.⁴⁷ Spend long enough talking to Bank staff and you will hear most contemporary development wisdoms articulated. This is, however, something of a red herring, as what really matters in the Bank are its structures rather than what particular individuals think. As Brechin argues: ‘to understand the World Bank and its operations, one must view it first as a bank’. (1997: 31).

The Bank can be understood as a matrix (Wade 1997). There are ‘vertical people’, country directors, and task managers who identify projects, and loan money, and there are those who are ‘horizontal people’ in thematic groups, cross-sectoral departments, or ‘families’ as they are labelled. These latter people deal in ideas and strategies, and are responsible for most of the impressive, sectoral or thematic publications which emanate from the Bank, and which have such an impact on wider development debates. While this ‘development guff’, as our informant amusedly referred to it, undoubtedly matters in contributing to – or preventing – paradigm shifts in development thinking, there are no significant structural mechanisms to translate this into an impact on the core Bank activity – lending money.⁴⁸ As Brechin argues:

Getting its loan portfolio out as quickly and efficiently as possible has been a major Bank objective that colours its internal operating procedures ... the need to move money has tended to bias the Bank’s lending activities to larger loan projects and to those that require less staff time to prepare and supervise. (1997: 33).⁴⁹

For a task manager preparing projects and securing loans is all. The incentive system for such staff rests on this, and promotions may be linked to the amount of money lent (Brechin 1997: 34). As a number of task managers commented to us, they really do not have the time to buy in ‘quality assurance’ time from the centre. They go through the hoops of the required environmental or social appraisals, but rely in preference on their own network of consultants who are both usually cheaper than Bank staff from the centre and will more reliably provide the sort of information to support their loan strategy. In the early days, when the SFI looked to be gearing up for big investments of rock phosphate or fertiliser, this had much appeal. Large disbursements looked to be on the horizon around a theme which fitted the new Bank rhetoric of poverty focussed, environmentally friendly investments. It is not surprising, then, that some of the SFI ‘successes’ as far as the Bank has been concerned have been linked to on-going fertiliser supply projects. To the cynical observer, the SFI offered a great opportunity to dress up what had been going on before in new clothes with a glossy international appeal. However, as the big investment option began to retreat, and alternative, rather less grandiose options were proposed (including by those in the Bank’s ideas centre), the appeal of the SFI certainly began to fade.

⁴⁷ An example is Daniel Benor, founder of the highly controversial World Bank Training and Visit agricultural extension approach. As one official commented: ‘an anti-Benor faction in the Bank want to link SFI and farmer-field schools... but everyone in the Bank is still looking over their shoulders at Benor, and new, adapted forms of T and V’.

⁴⁸ There are ‘anchors’ at the cross-over points in the matrix, but again these lack mechanisms for the horizontal to routinely imprint on the vertical.

⁴⁹ Brechin (1997) explains that for any bank, volume of lending, and turnover, alongside loan performance, are key yardsticks for evaluation. Important, of course, because the Bank has to maintain the confidence of the international financial community.

One official in the Bank lamented: ‘The bottleneck is the country directors they make decisions on the basis of macro-numbers not people. They don’t link human faces to decisions – rational Cartesian thinking. The farmer in Segou or Sikasso is just not in the picture’. A similar point was made by another staffer in the cross-cutting Rural Development Department:

Country directors are the kings in the Bank. 95 per cent are hard-nosed economists. They must choose between roads, AIDS, education etc. Unless they understand that you are investing in soil productivity increase then you get nowhere. Things have to be like a Coca-Cola machine. With soil fertility, one dollar now yields two to three dollars later on. They need it to be immediate.

Another complained that technical people – irrigation specialists, soil scientists, agronomists – were simply not being replaced in the Bank, other than with yet more economists.⁵⁰

Since many of the strongest advocates of soil fertility in the Bank are on the ‘quality’ or horizontal side we have one reason for the limited amount of SFI activity. As internal advocates in the Bank they can produce many impressive publications, convene a range of high profile workshops and even get the Bank President to proclaim on their behalf, but in terms of leverage on the core activity of the bank – loaning money – they have little purchase. Raising an issue like soil fertility therefore requires intense internal lobbying, most effectively articulated in the language of costs and benefits: ‘Country directors are the most important target to reach. To do that you have to make links between soil poverty, economic growth and human poverty’. Constructing these internal actor-networks between the horizontal and vertical structures of the Bank is hard to do: ‘Task managers in a tight budget situation bypass you, saying, “sorry we’ve no budget to bring you on board for quality enhancement”’. Interestingly, the only soil fertility action plan financed so far by the Bank is for Kenya, where there is a task manager who is unusually not an economist and has a background in soils and is committed to the broader SFI agenda.⁵¹

SFI advocates have therefore increasingly had to rely on others outside the Bank to see through their vision. The link with the FAO is key here. Action plans were produced with the FAO for 13 countries, out of the World Bank joint agreement fund with FAO, but this was not enough. To quote a Bank official ‘the problem is that action plans are there and there is no money forthcoming’.⁵² Without support from task managers within the Bank, they must rely on bilateral support to see through the plans developed. And this, as we have seen, has been fraught with problems.

⁵⁰ The Bank has however begun to recruit more sociologists and anthropologists in recent years, though the numbers are still small relative to economists, and they tend not to be task managers. However, according to Chambers, economists outnumber other social scientists by maybe fifty to one (Chambers 1997: 49–50). A basic organisational chart of the Bank is available at: <http://www.worldbank.org/html/extdr/about/orgcharts/>.

⁵¹ A report by one task manager, notes that in-country staff have not always been enthusiastic about the SFI: ‘the field staff shows little if any interest in helping with the Initiative because it has no related staff week allocations, and also because the Bank’s management has not sufficiently stressed the importance of the initiative to field staff’.

⁵² A researcher outside the Bank echoed the argument that the loans structure of the Bank biases it towards ‘straightforward’ investments: ‘the SFI pointed towards the setting up of Soil Management Units within national governments, an institutional measure which requires different processes, but not the type of thing that country economists are particularly interested in’.

6.3 Linking the global and the local

The complex jockeying for position and competition over ideas and funds both between and within organisations operating at the global level explains much of the fate of the SFI over the past few years. But the story is not complete without some reflection on the interaction of this global manoeuvring, and particular national and local contexts. International initiatives do not exist in complete isolation from smaller scales, rather there are always threads running from one to the other: localising the global and globalising the local. Local contexts affect, whether implicitly or explicitly, the shape of initiatives from conception through to their later stages. Take, for example, the Convention to Combat Desertification. While widely perceived as existing only in the organisational stratosphere, many would argue this initiative exists partly as a result of lobbying on behalf of African governments at Rio. Its current shape depends heavily on local contexts and continued interactions with the global secretariat (Toulmin 1995).

As we have argued, the global is contested and exists with many stamps on it. Despite the globalised representations of science and policy close scrutiny highlights a set of footprints leading off to particular localities – whether to field sites in Kenya and Mali, or laboratories and offices in Nairobi or Wageningen. The global, whatever the appearance, is never able to detach itself of its moorings to specific locales, it can just do more or less effective jobs at hiding them away.

So with the SFI. One informant reflected: ‘Where did the SFI begin? In Washington. That’s the problem with it.’ Another told of the chaos at the launch of the SFI at the World Food Summit in Rome in 1996, as staff ran around trying to find ‘black faces for the photo shoot’. So, although this global initiative was rooted from the start in western capitals, links to Africa, however dubiously, were quickly made. African bureaucracies are in a sense much like those that have a global stamp: they need funding, projects, initiatives to plan, and frameworks to discuss. It was relatively easy to find some common cause. As one official in the World Bank commented. A trade union spirit drives the SFI, linking national and international bureaucrats, we are all in the same trade union.’ He went on: ‘It’s a supply driven system – it’s true that initiatives are driven from the outside. When you offer cookies and peanuts – of course people join in’.

People join in and, in the process, they begin to negotiate as their more complicated bureaucratic and political settings come in to play, much as we have presented with the SFI core group. More actors, means, more complexity, and the difficulties of holding the network together, becomes even more challenging. In the process, new actor-networks are created reflecting particular parts of the global arena that are well connected to certain localities. With donors having favoured countries for aid disbursements and the international agencies wanting to link actions to on-going programmes the connections to the national level have been fragmentary. As a Bank official noted: ‘We can only work on a country to country basis – there is no general line’.⁵³ This has produced considerable frustration from some international players: ‘After Togo, soil fertility action plans have become ‘cook-books’ reflecting different interests’.

What happens in particular places also reflects the interests of those who are funding the activities. In

⁵³ A World Bank task manager notes in his report: ‘In countries such as Burkina Faso and Senegal, governments already have a strategy for dealing with the soil fertility issue and are not inclined to make any change. Funding sources for implementing the strategy already exist... FAO assistance for drafting action plans, although politely accepted, is not being effectively used’ (Prudencio 1998: 5).

some places where organisations like IFDC or ICRAF have been working for some time, the initiative has their stamp upon it. In others, bilateral aid agencies are essential for new funding. Rather despairingly one FAO official committed to the SFI observed: ‘without money people in the 14 countries won’t commit themselves to the work. Unless the bilaterals come on strong this just won’t be a huge thing’. In others it depends on the interests and predilections of Bank task managers who may link the SFI to an existing loan portfolio. In all of these places there are negotiations reflecting interests and contexts. In some places the SFI is on hold, or has been terminated because actor-networks could not be constructed between international and national players.

These interactions between the international and the national are often as important then as interactions within or between parts of the international in creating, upholding or reframing globalised knowledge and the frameworks that are created with it.⁵⁴ Uncertainties around science are opened up in some places, not in others. In some globalised science and the soil fertility crisis narrative very much shapes debate and planning, in others there may be more renegotiation to reflect local knowledge, local interests and local complexity. New and more actor-networks form around these things as the original core weakens in some places and extends itself in others. In other words, while at first sight the dominance of global discourses seems all powerful, this remains so only if the institutional commitments and practices required can be maintained in local spaces. An incredibly tight, focussed actor-network stretching from the global to the local is therefore essential. In the case of the SFI this could not be sustained. As the science got unpacked, key players failed to join up, and local contexts became impossible to ignore, the standardised global narrative began to dissipate and with it the actor-networks associated with the SFI launch. Four years on, the SFI is made up of a rather weakly linked, rather disparate constellation of fairly diverse interest and positions. A far cry from the original vision.

7. CONCLUSION

So what can we conclude from this story? The SFI can be seen as part of a broader pattern, typical of the post-Rio era, with globalised narratives of environmental change influencing particular courses of action at the local level. While there are clear peculiarities of the SFI case, some basic comparisons with, for example, the Convention to Combat Desertification, Sustainable Development Strategies or Environmental Action Plans show that a characteristic policy process is evident. The interactions of science, actor-networks and bureaucratic politics across scales from the global to the local result in a range of actions typified by action

⁵⁴ We have suggested a number of reasons for the unravelling of the Soil Fertility Initiative. To these might be added another, namely that if there is a development industry, this industry needs new products, as everything has its shelf life. When we began this research soil fertility stood at the apex of both food and environment debate, and as such looked to become a major policy issue. Now this appears less the case than before, and there are new priorities. At the time of writing biotechnology and water are the key themes. Interestingly, both the environmental degradation and food gap narratives we noted earlier are articulated as powerfully as ever in the attention-grabbing parts of policy documents, but now they are lined up to generate enthusiasm for new causes. Of course, this can all be analysed as an in-built need to go on generating new ideas to keep everyone busy: researchers, project managers and consultants. But it also reminds us that there are always universes of actor-networks beyond the one with which we are immediately concerned. So there are water or biotechnology policy entrepreneurs and actor-networks in the same way that there are webs of key protagonists in the soil fertility field.

plans, technical interventions and community based projects. These are not minor undertakings – significant investments of donor and government resources, both financial and human, are committed to such activities every year. It is difficult to assess what has been spent on the SFI as the activities have been too diffuse, spread, as we have seen, between a range of organisations and country actions. However, it is not insignificant. The question arises: is this an appropriate allocation of resources? What lessons can we draw from the SFI experience? What implications are there for the post-Rio approach to international environmental governance and policy processes more broadly?

Three conclusions are possible. The first is that, fine, the SFI started off a bit alarmist, and oversimplified the problem. However, because of this, people are now more aware of the issue – a ‘flag’ was raised, a ‘red lamp’ lit, and, as a result, some funds were committed. Through debate and interaction some of the more extreme claims were dismissed and some of the more fanciful project ideas rejected. And what has happened is a set of more-or-less sensible things in places where there is commitment. Horses for courses. The pragmatists’ line concedes things are not perfect, but what more can you expect from the development business? This is just how things work.

A second view offers a rather pessimistic perspective. Plenty of money and time has been wasted, with little result. At least no damage was done, but little was achieved either. Yet another example of the ‘post-Rio syndrome’, of how bureaucratic imperatives to create action plans around global problems is both diversionary and wasteful. The only achievements the SFI could boast in a recent summary paper were national action plans, the ICRAF work, the soil fertility management unit supported by IFDC in Burkina Faso, and the Rockefeller-funded SoilFertNet in Zimbabwe and Malawi (World Bank 1999). Except for the action plans all these things were going on before or independently of the SFI. Not very impressive would be one judgement. What is perhaps most problematic is that relatively scarce trained people have been diverted from doing useful things and have been whisked up into the international circuit, into the seemingly never-ending process of engagement with conventions, initiatives, plans and programmes conjured up in response to the global environment and development debate. This was a point acknowledged by an official in the Bank: ‘In Benin we discovered there were more networks than scientists – this leads to no time to do their own jobs’. In Zimbabwe, commentators referred to the ‘per diem hunting’ practices of government officials, and how at certain times no senior officials are present in the Ministry at all because of attendance at international meetings of various sorts. The Bank official admitted: ‘it takes others away from good work going on in country’.

A third view takes a more fundamentally critical stance. Through the creation of powerful actor-networks of scientists and policy actors in a range of organisations a problematic narrative was constructed. This had some success in some places, and has thus forced an agenda on unsuspecting people. Because it is insufficiently nuanced, and lacks local definition and ownership, this is potentially damaging, as alternative framings of the issue were not countenanced. The comment of a task manager about work in Mali reflected this: ‘In nowhere are we starting from zero – much is known already. We don’t need detailed research. We know that there is acidification in the cotton zone, erosion in the sandy areas and salinisation in the Office [du Niger]’. As this quote highlights, for all the talk of the SFI as participatory, there is not much room to

redefine the question, or challenge some of the key assumptions. And clearly, where the problem being addressed is misconceived, this can have high opportunity costs in terms of the use of scarce public funds.

So what do we conclude from our reflections on the SFI process and global policy processes more generally? As will almost certainly be clear by now, we locate ourselves at the more critical end of the spectrum. However, as one pragmatist commented to us ‘It’s easy for you researchers to be critical. But we all know the problems. Until you can come up with something better than what we are expected to do?’ Fair point. By offering a critique we do not want to suggest that all those involved are not aware of some of the failings we have highlighted. As we have indicated at various points in the paper, scientists are acutely aware of the limitations of their work, and are often aghast at the uses to which it is put. Equally, those operating in large bureaucracies confront the obstacles we have referred to on a daily basis and have necessarily developed all sorts of ways of coping with these. In the same way, the ‘policy entrepreneurs’ who are vocal champions of particular views know that only certain things get listened to, and respond accordingly, again being fully aware of the limitations of sound-bite style advocacy.

In other words, there is no large-scale conspiracy going on, orchestrated by bad people with malevolent intent. By teasing out the complexities of the policy process, our intention has been – by making the often implicit practices and processes of policy more explicit – to encourage a more open and informed discussion about how to improve things. It is widely accepted that the current situation is far from ideal. As a senior director in a UN organisation observed:

We’ve got to rethink what we do at the international level. We operate in a world which is out of touch. We have dozens of projects all over Africa, but most are disasters. This is not the way to go. We’ve got to find ways of linking what is really going on, on the ground, with the wider debates. By and large the convention processes have not done this. We need to find new ways.

So what lessons have we learned from the research reported here that might provide insights into these ‘new ways’ of doing things? A number of themes stand out. First, the scientific ‘facts’ upon which global initiatives are based are often plagued by uncertainties. As we saw in relation to the debate about rock phosphate and organic alternatives there is often little consensus even within the mainstream scientific community. Add in the often excluded perspectives from resource users themselves such uncertainties grow further. This, of course, is to be expected, but too often policy processes assume a rather linear mapping of uncontested technical scientific information on to policy solutions. If the local priorities, values and contexts where such solutions are expected to be applied are taken more firmly into account a diverse range of problem framings and potential solutions are almost inevitable. Accommodating such diversity within the current architecture of policy-making is, as we have seen, problematic.

The paper has highlighted the need to make explicit a recognition of the limitations of bureaucratic procedures. As we have seen, with particular mandates, organisational structures and incentive systems, policy outcomes are necessarily constrained. No matter how much rhetorical play is made of local perspectives and participatory processes, there are clear limits. Therefore if the rhetorical ideals are to be realised, a long, hard look at the organisational arrangements for policy-making will be required. While there

clearly is a role for international organisations, this may – as many informants we spoke to acknowledged – need to be redefined. Where complex, non-linear policy processes are at work, where contests of knowledge, politics and power are key, processes of convening, channelling and facilitating will be vital. Yet the current arrangements are clearly inadequate, set as they are within a linear vision of policy-making based on assumptions about unproblematic scientific framings and largely instrumental, top-down, managerial implementation procedures. The post-Rio flood of conventions, initiatives, programmes and action plans clearly in many ways reinforce this and so do not meet the demands of a flexible, adaptive and grounded policy process.

Yet, as we have seen, global agendas are far from monolithic. Particular narratives and discourses are often based on relatively fragile, clearly mutable actor-networks. There is also frequently an iterative shaping of agendas through interaction with local settings. But there remains a tension between the ‘stratospheric’ realms of the global debate and engagement with local settings which very often limits the ability for local voices to be heard. New more inclusive forms of deliberation in such global policy debates are clearly required,⁵⁵ which allow a diversity of perspectives to engage, opening up the ‘black boxes’ of mainstream science and bringing in different actors who can help reframe the questions and develop a greater diversity of solutions. Creating the framework for such engagement remains a major challenge for all international initiatives, including the SFI.

⁵⁵ New experiments in this area are emerging, known as deliberative inclusionary processes, or DIPs, these make use of new institutional mechanisms such as citizens’ juries, consensus conferences, and electronic polling. For a review of the literature on DIPs, see Bloomfield *et al.* (1998) and Holmes and Scoones (2000).

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