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7 *Biodiversity conservation against small-scale farming? Scientific evidences and emergence of new types of land crises*

Catherine E Laurent

Competition between different types of farmers for access to land for agricultural production has been a major source of conflict for decades in many countries. In these situations, small-scale farmers' and landless peoples' struggles have gained increasing political legitimacy compared to large-scale farms. As a source of income and food security for rural households, small-scale farming is viewed as a key element of rural livelihood improvement. But this legitimacy is increasingly being challenged by environmental lobbies. Environmental issues concern all types of farms; however, it is more difficult for small-scale farmers and their organisations to access and assess the scientific knowledge that is brought in the policy debate to support environmentalists' positions when conservation and production objectives seem contradictory. Hence, new elements have to be considered to analyse the changing power relations that structure land issues.

Some countries, such as South Africa, are emblematic of this general trend. In several cases during South Africa's transition in the 1990s, the legitimacy of the demands of potential black small-scale farmers for land was questioned. A first argument stated that replacing too many of the existing large-scale white farms with new non-skilled black farmers would threaten national production capacities. This debate was considered in many policy and scientific papers. The technical efficiency of small-scale farmers is a controversial, but old, issue. But the legitimacy of potential black small-scale farmers' demands is also challenged for ecological reasons, based on statements that insist on the negative impact of farm activities on biodiversity conservation. For instance, the re-establishment of black farmers on formerly extensive rangelands or in 'nature areas' is presented as a threat to biodiversity. However, from a scientific point of view, some ecological studies show that adequate farming practices can contribute to biodiversity conservation (Diaz et al. 2005). It thus appears necessary to understand what is really at stake when scientific arguments are put forward to oppose environmental issues to agrarian reform and agricultural development.

The aim of this chapter is to contribute to this analysis. It is based on African case studies. However, this new kind of situation, where farmers are confronted with ecological requirements and the strengthening of alliances between ecological lobbyists and large landowners, is a potential source of major land crises for the near future, not only in Africa but also in other regions of the world.

This chapter demonstrates that growing environmental concerns, such as the maintenance of biodiversity, tend to partially shift issues of land conflict by emphasising the long-term sustainability of natural resources. This goal requires the mobilisation of scientific knowledge, which the various protagonists do not all possess to the same degree. Hence, the role of this knowledge in political decision-making is changing, as the increasing use of the concept of 'evidence-based policy' attests. It thus seems relevant to identify the main lines of critical analysis of this new role of scientific knowledge in decisions on land policies. This reflection is particularly necessary insofar as convergent observations show that the focus on scientific arguments often seems to be a pseudo-rationalisation of policies used to reinforce the status quo, rather than a real attempt to reshape society–environment relations.

Small-scale farmers, land use and biodiversity conservation

The agriculture/environment interface is a growing source of problems, due not only to the frequently denounced negative effects of agriculture on the environment, but also to the increasing constraints that environmental conservation places on small-scale farmers and collective rangeland management. Different forms of land access regulation are expressions of the power relations unique to each society. History is filled with different 'solutions' to struggles for access to land. Assertion of the most violent submissive relationships resulted in large-scale despoilment (enclosures in England, appropriation of 'native' land during the colonisation process, etc.). Landless peasants, small farmers and farmers in colonised countries have always been the losers in this eternal tendency of dominant groups to seize land for their own use. The many resulting conflicts have, in some instances, led to more balanced power relations and consequently to the redistribution of access to land (via different forms of land reform) as well as to guaranteed ownership and use rights. The question of ownership rights is thus considered to be a key element in the regulation of land-related conflicts and is at the core of the main international organisations' recommendations on land policy (Deininger 2003).

But the upsurge of environmental concerns such as the conservation of biodiversity tends to radically change this logic by putting forward new imperatives. These considerably weaken the potential regulatory function of adjusting the balance of ownership to solve land-related conflicts.

It would be easy to believe that biodiversity conservation and poverty reduction are convergent objectives. This is the argument in many voluntarist discourses on the subject (IUCN 2002). It is also suggested in national documents (e.g. DEAT 1997) and by international organisations (e.g. UN 2005) that both objectives be stated together, without considering their possible contradictions. But this is not always a win–win situation.

The legitimacy of certain rural households' demands for land to begin farming, or even to continue farming on land that they already own, may be challenged in certain areas when agriculture is considered to have only negative effects on

natural resources. Even when the objectives of agricultural production and those of environmental protection can be reconciled, farmers in areas subject to protective measures have to comply with set specifications that reduce their autonomy, irrespective of their rights to the land. In addition, biodiversity conservation involves processes that transcend the spatial limits of farms (migration of certain species such as birds, etc.) as well as their time horizon (necessity to take into account the long-term effects of practices far beyond the life cycle of farm households). The issues to which the question of biodiversity conservation relates concern society as a whole (or are at least conceived as such) and not only the protagonists directly involved in land issues; in addition, mastering these issues requires knowledge that is developed in a particular sphere (the research world) and is not readily accessible to the majority of farmers concerned.

For instance, based on their observations of the South African land reform process, Kepe et al. (2005) show the conflicts that arise between conservation and production objectives when poor households want to retrieve the land taken from them and classified as protected natural areas under apartheid. In this study (Khanyano people/Mkanbati nature reserve), it appears that not only is the rangeland unlikely to be restored to poor households, but that the extension of the protected area will possibly further limit their access to natural resources and reduce the surface area of grazing land available to them. These findings corroborate observations in other countries, which show that, in many cases, local populations bear the brunt of the costs of biodiversity conservation (e.g. Brockington 2002).

In a recent review of the subject for the journal *Science*, Adams et al. (2004) note many authors' scepticism as to the possibility of combining poverty reduction and biodiversity conservation efforts, expressed by the term 'pro-poor conservation'. They cite a number of studies, all of which conclude that the creation of protected areas often has a negative impact on poverty. These authors thus propose a typology of the different situations of articulation between poverty reduction and biodiversity conservation that helps to explain why these relations may not always be viewed as a win-win situation. Where biodiversity conservation is at stake, farmers can be excluded from dialogue when they are located beyond the geographical limits of the conservation area. In this case, they may obtain specific benefits or suffer new constraints resulting from their proximity to these areas. Alternatively, in some places farmers are included in resource conservation schemes when environmental policy designers accept the idea that human agricultural activity may contribute positively to biodiversity conservation. But even in this case, farmers are more often the targets of prescriptions that they must comply with than real partners in decision-making. This unequal balance of power between farmers and other actors in negotiations on biodiversity and land use is often described. But it is not a mere continuation of age-old relations of domination where poor rural households have tenuous rights to their land and virtually no right to a say in the matter.

From this point of view, the South African examples are interesting. If we observe this inequality in the balance of power (e.g. Kepe et al. 2005), it is difficult to imagine

that it is a lack of politically legitimate land claims that places black rural households at a disadvantage in the debate. Despite all the obstacles, the South African land reform programme enjoys virtually unchallenged political legitimacy. We may therefore wonder whether a part of the difficulties they encounter in defending their vision of their future does not stem from incapacity to challenge the requirements of environmental protection – requirements presented as unquestionable statements, which are not open to debate.

Presently, rural households are not in a position to present scientific arguments on the appropriateness of the conservation measures proposed, nor are they able to offer alternative scenarios. The mobilisation of ecological knowledge in policy debates is new; as such, unions, civics and other political institutions have not yet fully analysed and made visible its social implications, as they did for some economic theories (e.g. regarding market regulation). Such knowledge is often considered as 'neutral', leading to some 'naturalisation' of ecological questions that are constructed by dominant stakeholders. Nevertheless, the way in which these measures are designed and the knowledge on which they are based can be questioned. Is it relevant that so little debate exists on the way in which knowledge is selected and mobilised to design environmental and land policies?

Evidence-based frameworks for policies?

The increasing mobilisation of arguments presented as 'scientifically validated' has opened a new research field concerning the content of that 'evidence', the way that policy-makers mobilise it, and the transformation of power struggles induced by land use conflicts. A growing number of documents on the analysis of land and environmental policies propose the adoption of evidence-based frameworks adapted from the field of health (Baranyi et al. 2004; Pullin et al. 2004).

Indeed, this discussion, which is strongly related to the question of appropriate use of scientific knowledge in practice, is partially based on the reflection and teachings of the evidence-based medicine (EBM) movement that has developed in the health sector since the 1990s. As such, the founding document of EBM (EBM-WG 1992) announced the advent of a new scientific paradigm. In fact, it was essentially a plea for medical practices wherein clinicians make 'conscientious, explicit and judicious use of current best evidence' for decisions on patient care (Sackett et al. 1996: 71). As many authors have subsequently noted, one cannot but agree with this objective of making the best possible use of available scientific knowledge for therapeutic decisions. Based primarily on this argument, the notion of EBM was transposed to decision-making in other areas, and the concept of evidence-based policy (EBP) was born.

At first, the idea of making the best possible use of available scientific knowledge may seem trivial. Yet surveys undertaken at the time of EBM's emergence showed that many medical doctors were unfamiliar with recent scientific data in their field and based their practice on routines, some of which were outdated. Therefore, the EBM movement has endeavoured to facilitate doctors' access to scientific data through the

compilation of easily accessible databases. It also offers incentives to perform and to disseminate various types of meta-knowledge (knowledge about the knowledge), such as quantitative meta-analyses, systematic reviews, and assessment of the level of proof provided by diverse observations. The aim is to ensure the accessibility of scientifically valid knowledge during doctors' initial – and ongoing – training, as well as in their day-to-day practice.

If we agree that science proposes not *one definitive truth*, but knowledge that evolves over time, we cannot but subscribe to this type of approach. With regards to land use, we may also question whether the prescriptions regarding biodiversity conservation, which now confront rural households, are indeed based on systematic and regularly updated reviews of the scientific literature.

Several studies with this objective reveal that this is not the case; rather, research indicates that the decisions taken and the practices implemented are generally based not on a review of existing scientific literature but on existing routines, without any attempt to identify alternative plans of action. The findings of Pullin et al. (2004: 247), who analysed 38 management plans of organisations involved in biological conservation in the UK, show that these plans:

...highlight a reliance on tradition as an indicator and guide to future management. In 66% of plans alternative actions did not appear to have been considered and in only 16% of plans were alternative actions discussed. In only 8% of the plans was any attempt to review the literature apparent and in no plan was it evident that the review had been extensive.

A review by Homewood (2004) on how biodiversity conservation policies in African rangelands affect development and welfare as well as environmental issues leads to similar statements. First, she stresses evidence in the scientific literature of the key role of buffer-zone habitation of rangelands for maintaining the biodiversity of protected areas. But she observes that this evidence has little impact on policy decisions and concludes that:

[g]overnment and donors need to find better ways of taking note of what research reveals about the way policy is operating, and of incorporating those insights into practice. Government policy documents, and popular assumptions as to the impact of local land use in sub-Saharan rangelands, have not kept pace with the data documenting environmental processes and outcome. National governments and also the international environmental lobby are resistant to those data, to the alternative models of underlying processes and to the alternative approaches they suggest. (Homewood 2004: 139)

In South Africa, a study of the White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity shows that, while negative impacts of agriculture on biodiversity are heavily documented, almost nothing is reported regarding the positive roles that agriculture can play in biodiversity conservation. Once again, this suggests that not all of the available scientific literature was used.

On the whole, the analysis of the literature shows that few decision-makers who deal with environmental problems systematically analyse scientific publications, even though they use arguments based on 'scientific knowledge'.

On the other hand, one must recognise that it is very difficult for any stakeholder (including policy-makers) to make their way in the maze of existing publications and to get a clear picture of all alternatives suggested by existing theories. Adequate meta-knowledge, such as updated systematic reviews made with explicit methodologies, showing the blind spots of the various approaches, is missing (Laurent et al. 2009).

A highly positive feature of evidence-based approaches is that they lead to explicit questions on the way that the knowledge underlying prescriptions is collected and selected. But apart from that, there are problems in the 'evidence' of 'evidence-based' frameworks. Feinstein and Horwitz (1997) have noted and analysed it for medicine. It seems that the same applies to EBP.

Problems of 'evidence' in EBPs

There are several problems with the 'evidence' aspect of EBPs. These problems emerge from the way evidence is constituted during scientific work, from the situations it is based on, and from the theories from which evidence stems. EBP is also a problem when knowledge, which is or is supposed to be scientific, is used as an authoritative argument to impose decisions that serve the interests of a particular group.

Scientific theories are changing and controversial

We know that in all of the sciences various paradigms coexist; these paradigms approach reality from different angles and, at some point in time, may be contradictory in their initial postulates. This concerns the 'hard' sciences like physics as well as the natural sciences and the social sciences (Anderl et al. 2002; Cartwright 1999). Moreover, scientific knowledge evolves and it is precisely the aim of a scientific approach to produce knowledge which is, if not 'true', then at least less false than preceding knowledge.

The rational use of scientific knowledge to solve a practical problem thus implies the mobilisation of the most recent scientific knowledge and the analysis of changes induced by scientific progress. Yet in many cases obsolete or doubtful theories are used to justify environmental protection measures, without any explanation of related controversies or their implications for action.

Many examples illustrate this argument. The most famous concerns the 'Tragedy of the Commons' (Hardin 1968), a theory that was subsequently recognised by its own author as being misleading (Hardin 1998). In the first paper, Hardin used communal grazing land as a key example. He proposed a theoretical model which showed that since each individual livestock keeper was selfish, norm-free and aimed to maximise short-term results from rangelands, the cumulative impact of rangeland users would ineluctably lead to the destruction of common resources.

But the reality is quite different and this model has been heavily contested since then. As Ostrom et al. noted in their review, ‘although tragedies have undoubtedly occurred, it is also obvious that for thousands of years people have self-organized to manage common pool resources, and users often do devise long-term sustainable institutions for governing these resources’ (1999: 278). Thus, ‘management’ is the key issue. Hardin (1998: 682) himself, commenting 30 years later on his 1968 paper and on the critiques he received, admitted that ‘repeatedly I found fault with my own conclusions...the weightiest mistake...was the omission of the modifying adjective “unmanaged”...’, adding that, for him, it was ‘with an unmanaged commons [that] ruin is inevitable’. Notwithstanding this admission, a large number of scientific publications note that Hardin’s 1968 theoretical model is still used to justify the privatisation of collective rangelands in many situations. This was the case again recently in South Africa (Allsopp et al. 2007; Rohde et al. 1999), despite agreement on the model’s shortcomings by the entire scientific community and even by the author himself.

Other examples of the coexistence of different theoretical standpoints could be mentioned, each of them calling for specific (and different) management measures:

- equilibrium ecological models that see alternative vegetation states as results of degradation from people and livestock versus disequilibrium models that suggest that ecosystem dynamics are driven by unpredictable and extreme fluctuations in biophysical factors (Ellis & Swift 1988; Vetter 2005); and
- rational choice theories of collective action in economics that postulate that a society is a set of selfish individuals versus historic institutionalist approaches which show the various levels of economic and social regulation.

The problem is that these controversies may be well known by some scientists but are rarely given enough attention by policy-makers. Consequently, policy-makers do not use scientific knowledge to feed alternative development scenarios. One of the main criticisms levelled at policy-makers who deny agriculture the possibility of playing a positive part in biodiversity preservation is that they select knowledge which serves their own aims *despite evidence to the contrary*, instead of submitting the range of alternatives to debate.

The problem of putting EBP into practice

Public action cannot have strictly scientific bases even if it updates its scientific sources. Scientific knowledge is always the result of a methodological simplification and can provide only incomplete views of reality. Consequently, a policy always has a strong peculiarity compared to the explanatory field of a given theory. There is no functional continuity between scientific theory and political decision-making, irrespective of the hegemonic intentions of any theory (e.g. the imperialism of some theories in economics or ecology). The logic underlying political and scientific discourses is of a radically different nature (Weber 1919): no matter how sophisticated, a scientific model cannot take into account the infinite elements that produce a real event; it can only *aid* political decision-making.

Rational use of knowledge as a decision-making aid, therefore, implies taking account of the necessarily incomplete and heterogeneous character of available scientific knowledge when addressing a practical problem. It also implies that political decisions, including those at a very local level, necessarily consider a set of complex elements and conflicts of interest. This is a point that certain theoretical approaches of EBP readily acknowledge (Davies & Nutley 2001; Gray 2001). On the other hand, findings show that in daily practices of negotiating land conflicts, the use of 'scientific evidence' is often a way of reinforcing existing power relations, rather than serving as a tool for explaining the ecological dimension of alternative development choices (Homewood 2004; Kepe et al. 2005).

In itself the phenomenon explained above is not new. For many years, trade unions, political parties and various associations have constructed social critiques of economists' approaches in order to enhance arguments based on economic results in political debate. What is new is the sudden appearance of arguments based on ecological theories without an existing social counterargument in land conflicts. Thus, these arguments tend to dominate without the various stakeholders in the political debate having an overview of what is at stake when one theoretical standpoint is favoured over another.

The problems with statistical data

Recognising the difference between political decision-making and scientific theory amounts to agreeing that policy-making requires different kinds of data. But the debate on EBP becomes confusing when political decision-makers consider widely diverse types of information as 'evidence'.

In their analysis of the UK government Cabinet Office's EBP 1999 agenda, Davies and Nutley (2001) remark that what is considered in this agenda as 'evidence' is extraordinarily broad and eclectic. The list of 'evidence' in this document includes '[e]xpert knowledge; published research; existing statistics; stakeholder consultation; previous policy evaluation; the internet; outcomes from consultations; costing of policy options; output from economic and statistical modelling' (Strategic Policy Making Team 1999, cited by Davies & Nutley 2001: 87). Such a list changes the nature of the EBP decision-making framework and of projects precisely aimed at distinguishing scientifically *validated* knowledge from ideas that may contain expert knowledge or opinions. It nevertheless clearly highlights the function of legitimisation of the notion of 'evidence' in policy-making.

In this list of information that policy-makers use as evidence, statistics represent a particularly sensitive point: an intermediate category between scientific knowledge and political management tools. The way in which statistics are constructed and used can be examined in light of criticism of EBM procedures. This criticism emphasises the fact that 'evidence' is the result of investigations undertaken in a singular context, and that we need to measure the limits of their use by taking into

account the scope of their validity and the conventional rules (methods, etc.) that supported their construction.

Consider the example of South African statistical data for examining the role that they can play in the political regulation of relations between objectives of agricultural production and those of biodiversity protection. This example is interesting because it is both explicit and official that '[t]hrough the National Statistic System, Stats SA aims to promote evidence-based-policy-making, monitoring and evaluation in Government by establishing quality standards for official statistics...' (National Treasury 2003: 269). Moreover, we know that it is customary for statisticians to list the conventions guiding their work (conventions for the definitions of the categories chosen, conventions for collecting and processing data) (Desrosière 2002). A series of interviews with Statistics South Africa statisticians showed that they readily agree with the provision of this information, whether it consists of published documents or informal data, to assist in understanding how the basic definitions and samples were negotiated between the stakeholders. How can available statistics help to build reliable evidence on existing or possible relations between agriculture and biodiversity conservation?

An examination of the statistical conventions and available data shows that it is impossible in South Africa to use statistics to grasp possible relations between the agricultural activity of black households on rangelands and biodiversity. Agriculture is understood primarily as an economic sector that supplies goods for the market, and not as a sector of activity through which a large proportion of the population is in direct contact with the land. Consequently, the Agricultural Census is focused only on large-scale farms (so-called commercial farms with an annual turnover in excess of R300 000). These farms, considered as part of the scope of 'economic' statistics, are carefully recorded (there were less than 60 000 in the last census) and a profusion of data concerning them is available. In contrast, smaller farms (the number of which is uncertain: somewhere between 0.8 and 2.5 million) are considered to fall into 'social' statistics. They are the subject of highly simplified surveys that provide no indication of their agricultural practices or the performance of these practices. A specific survey ('2000 survey of large- and small-scale agriculture') was undertaken once, but its interpretation was complicated by the selected sampling procedures (Stats SA 2002).

Hence, no global data source is available to account for the farm activity (livestock keeping or crops) of black households in private rangelands, in the commons or in small intensive farming, despite the fact that their role in biodiversity management seems essential. In areas of high priority for the objectives of biodiversity conservation, scientists are virtually without any statistics on the economy or the structures of the farms concerned. Consequently, they lack the traditional tools of generalisation for case studies. Thus, even if some case studies show that the impact of small farmers on biodiversity may be positive under certain conditions, there are no data for testing the validity of these results in other situations and/or at a regional level. This observation

made in a country benefiting from a strong statistical apparatus is consistent with a more general statement made by Carpenter et al. (2006) for the millennium ecosystem assessment: there is a tremendous lack of knowledge and data linking social and ecological processes at a scale that is relevant for policy-making. Therefore, it may be understandable that policy-makers develop a particular 'preference' for measures based on zoning that recommend unhitching agriculture from conservation. Once established, the management of these zones requires no statistical data of a different nature to that which is available. The vicious circle is completed.

Conclusion

This incursion into the fields of EBP reveals its usefulness as a guideline for analysing the way in which scientific knowledge is mobilised in land and conservation policies, what knowledge is actually available, how it is used to improve the technical content of environmental policies, but also how it can be selectively chosen to strengthen the power positions of some stakeholders.

The reasons why such an approach is getting more and more attention cannot be ignored: the status of knowledge in policy decisions is changing, and a better understanding of the new function given to scientific evidence in policy decisions involving land issues is crucial. Part of the answer to the uncertainty raised by sustainable development issues is sought in research outcomes. Scientific knowledge is increasingly used to justify certain views of relations between human societies and uses of natural resources. Yet we observe that often decision-makers fail to perform the scientific inquiry that would allow them to make better use of all available scientific knowledge. Sometimes theories that are questionable or even universally known to be false ('Tragedy of the Commons' is the example offered) are mobilised to justify certain measures. Most often, known scientific theories offer the possibility of conceiving alternative measures to those proposed, but such scenarios have not been fully formulated.

Several causes contribute to an explanation. First, adequate knowledge is missing. Decisions regarding agri-environmental issues involve social, biotechnical and ecological processes but there is a lack of such interdisciplinary knowledge at scales that are relevant for policy-makers. In addition, the available disciplinary knowledge is difficult to use. There is a lack of meta-knowledge that would allow policy-makers and other stakeholders to get a clear picture of the existing theories, the scenarios they suggest, their limits, and the possibilities they open.

That is why it seems necessary to develop interdisciplinary approaches that link the social sciences with the natural sciences at a scale that is relevant for policy-makers, but also to produce and make available for all stakeholders more meta-knowledge of the current scientific knowledge on the interaction between agriculture and biodiversity conservation. At the moment, the various actors have very asymmetrical positions. Dominant stakeholders can more easily mobilise experts to build such meta-knowledge, and even produce ad hoc knowledge (for

instance, biodiversity inventory) to support their positions. Therefore, in many cases the use of scientific data to justify biodiversity conservation measures seems to be a pseudo-rationalisation of policies that serve to strengthen the existing balance of power, rather than making a real attempt to reshape society–environment relations by making the best possible use of available knowledge.

These old concerns must be considered with a renewed interest because the current period is characterised by two major changes:

- the increasing pressure on limited resources will result in an upsurge of technical sub-measures in land regulation, giving more importance to this issue of validated knowledge; and
- while a social criticism of economics and other social sciences was built over the last century by various stakeholders (unions, political parties, etc.), the mobilisation of ecological knowledge in policy debates is new. It does not benefit from the same social criticism and is often considered as ‘neutral’, leading to some ‘naturalisation’ of ecological questions that are built by dominant stakeholders.

Hence, the challenge for researchers has several dimensions: to provide a better analysis of the social and ecological implications of various forms of association of agricultural production and environmental protection objectives, to recall the interests and limitations of any available scientific knowledge and the subsequent importance of the political negotiation process, but also to give all stakeholders access to the available scientific knowledge through the development of adequate meta-knowledge that will allow them to fully assess the limitations of the outcomes of different theories and the interests of the development scenarios they suggest.

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