
Policy piece

Two cultures and tragedy of the commons

Jon C. Lovett¹, Claire H. Quinn¹, David G. Ockwell¹ and Robbie Gregorowski²

¹*Centre for Ecology, Law and Policy, Environment Department, University of York, York, YO10 5DD, U.K.,*

²*Natural Resources System Programme, HTSPE, Thamesfield House, Boundary Way, Hemel Hempstead, HP2 7SR, U.K.*

In 1959 the scientist, administrator and novelist C.P. Snow gave a lecture in Cambridge entitled 'The Two Cultures and the Scientific Revolution' in which he said that 'intellectual life of the whole of western society is increasingly split into two groups', which he identified as literary intellectuals and scientists (Snow, 1998). The 'Two Cultures' theme was taken up again 9 years later in another famous paper 'The Tragedy of the Commons' written by the biologist Garrett Hardin (Hardin, 1968). This time however the polarization was between social and natural scientists. Here we will use the case of land management in Africa to show that this divide is alive and well. We will start by describing recent criticisms of the research agenda incurred by the U.K. Department for International Development (DFID) and then look at the sweeping land tenure reforms underway in Africa. Finally we will discuss why this is significant for ecology and emphasize how important it is for African ecologists to be interdisciplinary and avoid policy pitfalls associated with the two cultures divide.

On the 26 October 2004 the U.K. government International Development Committee published a report on science in British-funded international development (Gibson, 2004). The committee is appointed by parliament to oversee the spending, administration and policy of the U.K. Department for International Development (DFID), so the findings were of particular interest for ecologists in Africa whose work includes development issues. The report was sharply critical of the lack of science in DFID, so much so that the U.K. Royal Society issued a statement that said:

"The report into the use of science in U.K. International Development policy highlights the Royal Society's concern that the Department for International Development's (DFID) efforts to tackle the pressing issues facing the world's poorest countries

have been hampered by a failure to harness the full potential of science and technology." (Royal Society, 2004)

The type of science envisaged by the Royal Society is for "robust vaccination programmes and drought-resistant crops" achieved through recent innovations such as biotechnology. The expectation is that improved yields will play a major role in poverty alleviation through enhanced agricultural productivity.

In many ways the criticism is remarkable. For the last 10 years DFID has been funding a Renewable Natural Resources Research Strategy (RNRRS) at a cost of over £190 million with 56% of this money spent in Africa. In June 2005 the RNRRS was evaluated (LTS International, 2005). The reviewers found that the science supported by the programme was of a high quality, saying that the "RNRRS has established itself globally as possibly the leading research programme in natural resource management" (LTS International, 2005 p. 27). In particular the review emphasized the important changes that the livelihoods approach (Carney, 1998; Scoones, 1998) embraced by DFID had created in the research, with an increased emphasis on social sciences and multi-disciplinary work.

So it is pertinent to ask why there is such a marked difference in opinion between the U.K. government select committee report and august bodies such as the Royal Society, and the independent evaluation of the research funded by DFID. One possible explanation is the classic academic divide between social and natural sciences. Returning to Hardin's, 1968 paper we can see that, although published nearly 40 years ago, it perfectly captures the gap in thinking between the views expressed by the select committee report on Science and International Development as endorsed by the Royal Society, and the research carried out by DFID under its RNRRS. Hardin described the gulf thus:

"An implicit and almost universal assumption of discussions published in professional and semi-popular scientific journals is that the problem under discussion has a technical solution. A technical solution may be defined as one that requires a change only in the techniques of the natural sciences, demanding little or nothing in the way of change in human

values or ideas of morality. The class of 'no technical solution problems' has members.... They think that farming the seas or developing new strains of wheat will solve the problem – technologically. I try to show here that the solution they seek cannot be found." (Hardin, 1968, p. 1243)

Hardin then goes on to describe the problems associated with management of a pastureland common pool resource (CPR) under an open access regime concluding that "Each man is locked into a system that compels him to increase his herd without limit – in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons." Effective and equitable management of CPRs is a topic that has been a focus of attention by parts of DFID's RNRRS, such as under the multi-disciplinary Natural Resources Systems Programme (NRSP).

Why is research on the management of CPRs so important? From an ecological perspective, most of Africa's biodiversity lives in CPRs under systems of low intensity management. From a social point of view CPRs are vital resources for the rural poor (IFAD, 1995). Evidence for the role they play in livelihoods of poor people is overwhelming. It is estimated that 15 million people extract resources from sub-Saharan African forest CPRs (Arnold & Townson, 1998). In Nigeria, CPRs are used for food, fuel wood, income generation and traditional medicine with individual earnings ranging from US\$817–5200 per annum (Osemeobo, 1991, 1993). The poorest households in Ayirebi town in Ghana rely on CPRs to meet 20% of their needs in the lean season (Dei, 1992) and in Shindi District, Zimbabwe, CPRs make up 40% of poor people's income (Cavendish, 2000). In Ikuwala village, Tanzania 60% of the poorest households rely on natural resources to provide at least part of their income with collection and sale of thatching grass and fuel wood key CPR uses (Birch-Thomsen, Frederiksen & Sano, 2001). In Koor town, northern Kenya, 22% of women generate part of their income from the sale of fuel wood collected from CPRs (Nduma, Kristjanson & Mcpeak, 2001) and in South Africa, communities in three villages regularly use between 18–27 wild products from CPRs and 100–300 species, excluding medicinal plants (Shackleton, Shackleton & Cousins, 2000). This evidence emphasizes that a fundamental way to help poor people is to ensure just and effective management of CPRs.

Despite their clear importance, management of CPRs is not easy. They are available to more than one person and

can be subject to degradation from overuse—the "Tragedy of the Commons". One person's use of the commons subtracts from its use by others and there is difficulty in excluding access (Ostrom, 1990, 2000; Cousins, 2000; Dietz *et al.*, 2002). The key to successful management of CPRs is the establishment of appropriate property rights. At first glance this might seem straight forward—the resources simply need to be 'owned' by someone or a group, but in fact property rights systems on CPRs can be quite complicated. Five property rights have been identified with respect to natural resources. These are rights of access, withdrawal, management, exclusion and alienation (Schlager & Ostrom, 1992; Ostrom, 2000). Access rights allow individuals the right to access resources for nonsubtractive uses. Withdrawal rights allow individuals to capture resource units from a resource. Management rights allow individuals to make improvements and decisions regarding resource allocation, while exclusion rights allow individuals to decide who should be allowed access, withdrawal or exclusion rights. Finally, alienation rights mean that individuals can sell or transfer their property rights to a resource. Under traditional management in Africa CPRs are usually communally managed under a range of different rights of resources in a system called a common property regime. However, if someone holds all five rights then they are an 'owner' with private property ownership (Schlager & Ostrom, 1992; Ostrom, 2000). Because of the potential of degradation of CPRs identified by Hardin, private ownership has attracted the interest of policy makers.

The strengths of private property rights have been recognized by major economic organizations (World Bank, 2003) and they are promoted as a means of poverty alleviation in the controversial book 'The Mystery of Capital' (de Soto, 2000). Essentially, de Soto's thesis is that the reason why Western economies are successful is that private property rights empower people through creation of capital and facilitating access to credit. The theory goes that if the same approach is applied to developing countries then poverty reduction will follow. The attractiveness of this idea has resulted in the formation of a 'High Level Commission on Legal Empowerment of the Poor' (<http://legalempowerment.undp.org/>). The commission was launched on 6 September 2005 and is co-chaired by Madeline K. Albright, a former Secretary of State of the U.S.A. and Hernando de Soto himself. The commission takes its approach from de Soto's book and states that the "central challenge for poverty reduction is therefore to

expand the rule of law to all citizens... Guaranteeing the poor the right to property is a key challenge.”

There is good empirical evidence for the importance of secure private property rights. In Kenya it was found that woody biomass was greater on private land holdings (Holmgren, Masakha & Sjöholm, 1994), more people resulted in less erosion under conditions of secure land tenure (Tiffen, Mortimore & Gichuki, 1994, p. 280) and privatization of CPRs is recommended to improve livelihood strategies in Kajaiido District (Kabubo-Mariara, 2005). In Ethiopia land transfer rights were found to enhance investment in terracing (Deininger & Jin, in press) and in Zambia farm productivity is higher on farms with tenure security (Smith, 2004). As a result there is a sweeping tide of land law reform taking place in Africa with greater legal emphasis being put on private land ownership and one of the central planks of the recent Commission for Africa report was that there should be increased security for agricultural investments (Commission for Africa, 2005).

However, a number of concerns have been expressed about these legal changes. Firstly, the ability of states to implement the new land laws has been questioned. There are simply not enough qualified people to carry out the cadastral surveys or appropriately trained administrators (Coldham, 2000; Manji, 2001). But the most challenging legal task will be to reconcile customary law with the incoming codified law (McAuslan, 1998). For example, the position of women in customary law can be very different from that in codified law (McAuslan, 1998, p. 541). Secondly, redistribution of land into private ownership of poor people does not guarantee poverty alleviation by itself. There have to be substantial inputs from government in the form technical support and cushioning from risk of crop failure (Bradstock, 2005). Thirdly, it is not clear that private property regimes actually do offer such strong advantages over traditional common ownership in terms of offering investment opportunities and production (Sjåstad & Bromley, 1997; Brasselle, Gaspart & Platteau, 2002; Lesorogol, 2005). And fourthly, there is a real danger of ‘elite capture’ (Crook, 2003; Platteau & Gaspart, 2003). Richer members of the local society or outside investors who can afford cadastral surveys and have technical agricultural knowledge are able to sequester the best land and key natural resources under private regimes (Lesorogol, 2005). Under private ownership the poor could very well be excluded from the natural resources, which have tra-

ditionally provided them with a source of income and safety net in times of need.

To come back to the theme of two cultures, the subject of private appropriation of common natural resources was the subject of a short story by someone that C.P. Snow would recognize as a literary intellectual: the Nobel Prize winning Japanese author Yasunari Kawabata. The story ‘History’ tells the tale of a village in rural Japan (Kawabata, 1997). When a new road was built to the village the villagers were worried that it was a harbinger of war. Then a rich old man arrived and built a villa and a public bath by the village spring, which was on the land he acquired. However, when the man died and his son inherited the property, he transformed the villa into a hotel. The public bath was then surrounded by a stonewall, restricting it to exclusive use by the hotel’s guests. The common resource of the village spring was now privatized. When the villagers confronted him, he told them:

“If you were so shocked when you first realized what kind of intentions that road had, you had better open your eyes while you can and think about the intentions that lie behind that highway.”

With an increasing policy shift away from traditional communal management of CPRs towards private regimes, ecologists, like the villagers in Kawabata’s story, need to consider the consequences of the changes and the kind of intentions that lie behind the move towards codified property rights. Firstly, there are of course the obvious social implications. Customary law tends to provide poor people with access rights to natural resources, where-as the market economy created by codified land rights means that the best parcels of land are sold into private hands. Traditional land management is flexible and dynamic, taking into account both spatial and temporal variation of ecological resources. This enables people to move in the landscape in response to factors such as climate variability, something which will be of increasing importance under global warming (Lovett, Midgley & Barnard, 2005). Once legally defined boundaries are created and ownership privatized, then this sort of flexibility is no longer possible. Secondly, much of Africa’s biodiversity and many of its ecosystems are managed communally, or under State control for common national interests. A shift to privatized agriculture, which is also a prerequisite for the application of technical scientific innovations such as biotechnologically engineered drought resistant crops and vaccinated livestock as suggested by the Royal Society, will result in ecological changes following intensification of farming,

such as diversion of water for irrigation and inputs of fertilizers and pesticides. This is not to say that we should dismiss the potential role of science in helping to solve Africa's problems, but scientists need to also bear in mind the policy contexts of land management. Let us have a look at an example from DFID's RNRRS portfolio of projects at how a multi-disciplinary approach is being applied in semi-arid Tanzania. A review of CPRs found that water availability was viewed as the key risk to livelihoods (project R7857; Quinn *et al.*, 2003) and explored how local institutions adapted to ecological dynamics of natural resources (Quinn *et al.*, In press). Another project in dry land Tanzania (R8116) is researching how rainwater can be efficiently and equitably managed, building on extensive modelling research on rainwater harvesting funded by DFID (Young *et al.* 2002). It is applying CPR management principles to the implementation of the technical innovations proposed by the models, aiming to create institutions that will work in the best interests of poor people dependent on land and rain for their livelihoods (reports for R7857, R8116 and related projects can be found on: <http://www.infobridge.org/nrsp/search.asp>). Scientists and parliamentarians who are calling for a shift of funding in DFID towards the 'science' of biotechnology need to bear in mind the two cultures of both natural and social sciences. Under what property rights regimes are these innovations going to be deployed and what will be their social and ecological effects? If these questions are not asked there could be a new tragedy of the commons in which natural resources are denied to Africa's poor and African ecosystems which have developed together with traditional management are irreversibly transformed.

Acknowledgements

This review was carried out under project R8501 Synthesis of Common Pool Resource Studies supported by the DFID NRSP. This publication is an output from a project funded by the U.K. Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID. We are grateful for support from Christopher Floyd, NRSP programme manager and to the participants of the Internet forum on 'Rural Common Property in a Perspective of Development and Modernization' organized by the FAO Land Tenure Service, the Collective Action on Property Rights initiative (CAPRI) and the international Land Coalition (ILC) for stimulating discussion.

References

- ARNOLD, M. & TOWNSON, I. (1998) Assessing the Potential of Forest Product Activities to Contribute to Rural Incomes in Africa. *Natural Resource Perspectives* 37. Overseas Development Institute, London.
- BIRCH-THOMSEN, T., FREDERIKSEN, P. & SANO, H.O. (2001) A livelihood perspective on natural resource management and environmental change in semi-arid Tanzania. *Econ. Geogr.* 77, 41–66.
- BRADSTOCK, A. (2005) Changing livelihoods and land reform: evidence from the northern Cape Province of South Africa. *World Dev.* 33, 1979–1992.
- BRASSELE, A.S., GASPART, F. & PLATTEAU, J.P. (2002) Land tenure security and investment incentives: puzzling evidence from Burkina Faso. *J. Dev. Econ.* 67, 373–418.
- CARNEY, D. (1998) Sustainable Rural Livelihoods: What Contribution Can We Make? Department for International Development, London.
- CAVENDISH, W. (2000) Empirical irregularities in the poverty-environment relationship of rural households: evidence from Zimbabwe. *World Dev.* 28, 1979–2003.
- COLDHAM, S. (2000) Land reform and customary rights in Uganda. *J. Afr. Law* 44, 65–77.
- Commission for Africa (2005) Our Common Interest. Report of the Commission for Africa. Commission for Africa, London, Available on: <http://www.commissionforafrica.org/>.
- COUSINS, B. (2000) Tenure and common property resources in Africa. In: *Evolving Land Rights, Policy and Tenure in Africa* (Eds C. TOULMIN & J. F. QUAN). DFID/NRI, London, pp. 151–179.
- CROOK, R.C. (2003) Decentralisation and poverty reduction in Africa: the politics of local-central relations. *Public Adm. Dev.* 23, 77–88.
- DEI, G. (1992) In: *A Ghanaian Rural Community: Indigenous Responses to Seasonal Food Supply Cycles and the Socio-Environmental Stresses of the 1980s. Development from Within: Survival in Rural Africa* (Eds D.R. FRASER TAYLOR & F. MACKENZIE). Routledge, London, pp. 58–81.
- DEININGER, K. & JIN, S. (in press) Tenure security and land-related investment: evidence from Ethiopia. *Europ. Econ. Rev.*
- DIETZ, T., DOLŠAK, N., OSTROM, E. & STERN, P.C. (2002) In: *Introduction: The Drama of the Commons. The Drama of the Commons: committee on the Human Dimensions of Global Change* (Eds E. OSTROM, T. DIETZ, N. DOLŠAK, P.C. STERN, S. STOVICH & E.U. WEBER). National Academy Press, Washington DC, pp. 3–36.
- GIBSON, I. (2004) The Use of Science in UK International Development Policy. House of Commons Science and Technology Committee. The Stationery Office Limited, London. Available on: <http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/133/133.pdf>.
- HARDIN, G. (1968) The tragedy of the commons. *Science.* 162, 1243–1248.
- HOLMGREN, P., MASAKHA, E.J. & SJÖHOLM, H. (1994) Not all African land is being degraded: a recent survey of trees on farms in

- Kenya reveals rapidly increasing forest resources. *Ambio* **23**, 390–395.
- IFAD (1995) Common Property Resources and the Rural Poor in Sub-Saharan Africa. International Fund for Agricultural Development, Rome.
- KABUDO-MARIARA, J. (2005) Herders response to acute land pressure under changing property rights: some insights from Kajiado District, Kenya. *Environment and Development Economics*, **9**, 67–85.
- KAWABATA, Y. (1997) History. In: *The Dancing Girl of Izu and Other Stories* (Trans. J.M. HOLMAN). Counterpoint, Washington DC, pp. 139–141.
- LESOROGOL, C.K. (2005) Privatizing pastoral lands: economic and normative outcomes in Kenya. *World Dev.* **33**, 1959–1978.
- LOVETT, J.C., MIDGLEY, G.F. & BARNARD, P. (2005) Climate change and ecology in Africa. *Afr. J. Ecol.* **43**, 167–169.
- LTS International (2005) Evaluation of the DFID Renewable Natural Resources Research Strategy. Department for International Development, London. Available on: <http://www.dfid.gov.uk/aboutdfid/performance/files/ev659.asp>.
- MANJI, A. (2001) Land reform in the shadow of the state: the implementation of new land laws in Sub-Saharan Africa. *Third World Q.* **22**, 327–342.
- MCAUSLAN, P. (1998) Making law work: restructuring land relations in Africa. *Dev. Change* **29**, 525–552.
- NDUMA, I., KRISTJANSON, P. & MCPHEAK, J. (2001) Diversity in income-generating activities for sedentarized pastoral women in northern Kenya. *Hum. Organ.* **60**, 319–325.
- OSEMEOBO, G.J. (1991) Effects of common property resource utilisation on wildlife conservation in Nigeria. *GeoJournal* **23**, 241–248.
- OSEMEOBO, G.J. (1993) The hazards of rural poverty: decline in common property resources in Nigerian rainforest ecosystems. *J. Environ. Manage.* **38**, 201–212.
- OSTROM, E. (1990) *Governing the Commons: the Evolution of Institutions for Collective Action*. Cambridge University Press, Cambridge.
- OSTROM, E. (2000) Private and common property rights. In: *Encyclopaedia of Law and Economics* (Eds. B. BOUCKAERT & G. DE GEEST). Edward Elgar Publishing, Cheltenham. pp. 332–379.
- PLATTEAU, J.P. & GASPART, F. (2003) The risk of resource misappropriation in community-driven development. *World Dev.* **31**, 1687–1703.
- QUINN, C.H., HUBY, M., KIWASILA, H. & LOVETT, J.C. (2003) Local perceptions of risk to livelihood in semi-arid Tanzania. *J. Environ. Manage.* **68**, 111–119.
- QUINN, C.H., HUBY, M., KIWASILA, H. & LOVETT, J.C. (in press) Design principles and Common Pool Resource management: an institutional approach to evaluating community management in semi-arid Tanzania. *J. Environ. Manage.*
- Royal Society (2004) Royal Society Response to Select Committee International Development and Science Report. 26 Oct 2004. Available on: <http://www.royalsoc.ac.uk/news.asp?year=&id=2669>.
- SCHLAGER, E. & OSTROM, E. (1992) Property-rights regimes and natural resources: a conceptual analysis. *Land Econ.*, **68**, 249–262.
- SCOONES, I. (1998) *Sustainable Rural Livelihoods: a Framework for Analysis*. IDS working paper 72, Institute of Development Studies, Brighton.
- SHACKLETON, S., SHACKLETON, C., & COUSINS, B. (2000) *Re-Valuing the Communal Lands of Southern Africa: New Understanding of Rural Livelihoods*. Natural Resource Perspectives 62. ODI, London.
- SJÅSTAD, E. & BROMLEY, D.W. (1997) Indigenous land rights in sub-Saharan Africa: appropriation, security and investment demand. *World Dev* **24**, 549–562.
- SMITH, J. (2004) Land tenure, fixed investment, and farm productivity: evidence from Zambia's southern province. *World Dev.*, **32**, 1641–1661.
- SNOW, C.P. (1998) *The Two Cultures*. Cambridge University Press, Cambridge.
- DE SOTO, H. (2000) *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else*. Basic Books, New York.
- TIFFEN, M., MORTIMORE, M. & GICHUKI, F. (1994) *More People, Less Erosion. Environmental Recovery in Kenya*. Wiley, Chichester.
- World Bank (2003) *Land Policies for Growth and Poverty Reduction*. World Bank, Washington DC.
- YOUNG, M.D.B., GOWING, J.W., WYSEURE, G.C.L. & HATIBU, N. (2002) Parched- Thirst: development and validation of a process-based model of rainwater harvesting. *Agric. water manage.* **55**, 121–140.