LINKING SUSTAINAGILITY AND AGROFORESTRY SCIENCE TO MULTIFUNCTIONAL POLICY ACTION

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ABSTRACT
Agroforestry as a concept has its roots in a critique of a development pathway that segregates functions in the landscape. By building on the multifunctionality of landscapes in which trees serve multiple functions in the provision of both goods and services, agroforestry research aims to enhance the understanding of tradeoffs (at patch, field and landscape scale), find ways to maximise local benefits, provide global benefits through appropriate incentives and challenge the regulatory frameworks that 'divide and rule'. As the continued 'agility' of farmers is crucial for continued adaptation to changing climate, markets and livelihood options, we are interested in 'sustainagility': properties of a system that support actors to cope with change, to be adaptive and resilient. Sustainagility complements sustainability at any scale, and contributes to 'meeting current needs without compromising the future'. Trees and diversity in landscapes contribute to sustainagility. To be effective in this area requires ability to handle 'conceptual pluralism' and be an effective communicator and often interlocutor between local ecological knowledge (LEK), the ecological knowledge and paradigms of public policy (PEK) and the ecological knowledge, models and systems analysis of science (MEK). As 'boundary agent', the agroforester has to obey the rules of the game of science with its absence of everlasting truths, trust in empiricism, reliance on trustworthy data and continued challenge to 'predictability' by maximising clarity of thought.. But she/he also has to obey rules of effectiveness as change agent: understanding, respecting and appreciating the perspectives of multiple stakeholders, optimal ambiguity as basis for political platforms and policy progress, and the relevance of 'buy in' through intellectual ownership of self-discovered ideas, rather than being taught. The pursuit of 'sustainagility science' is a challenge for African universities as training ground for 'boundary agents', as much as for those in Asia and other parts of the world.

1.0 INTRODUCTION

Agroforestry as the interface of the agricultural and forestry spheres has strong roots in an 'integrate' approach to multifunctionality. It achieves short, medium and long term goals in the provision of valued goods and services. The 'segregate' approach as alternative path to achieving multiple goals by intensive agriculture (or tree production) in one part of the landscape and areas dedicated to conservation elsewhere has minimized the interface of agriculture and natural forests in the dominant 'development' paradigm of the past century – leading to the articulation of 'integrated' systems, including agroforestry, as a counter-movement in the past decades.

The segregate or integrate choice plays out at multiple spatial scales, from farm to landscape, but also across time. The 'segregate' pathway has been associated with the 'intensification' hypothesis, expecting that more productive forms of agriculture will leave more space for conservation. In reality, however, this forms a necessary but not sufficient condition for achieving conservation goals. The shape of tradeoff curves between the multiple functions provides a guide to rational choices in the segregate-or-integrate dilemma. Locking up land for single functions may seem efficient for now, but reduces future options. The sustainagility questions focuses on the maintenance of resources for future change and includes the reversibility of choices and opportunities for cross-scale access to biological resources for future goods and services.

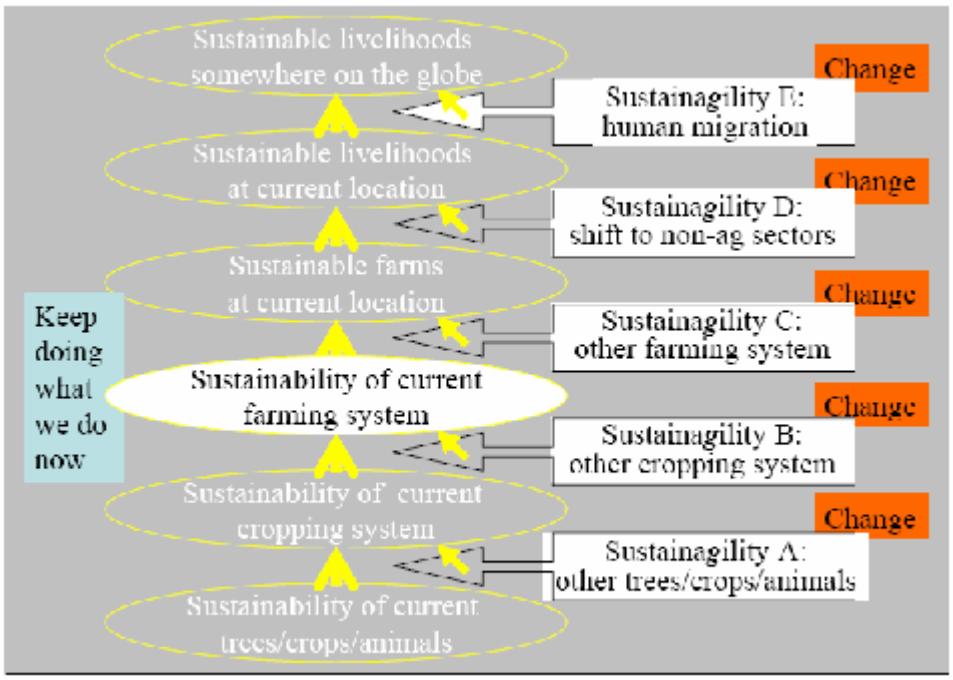
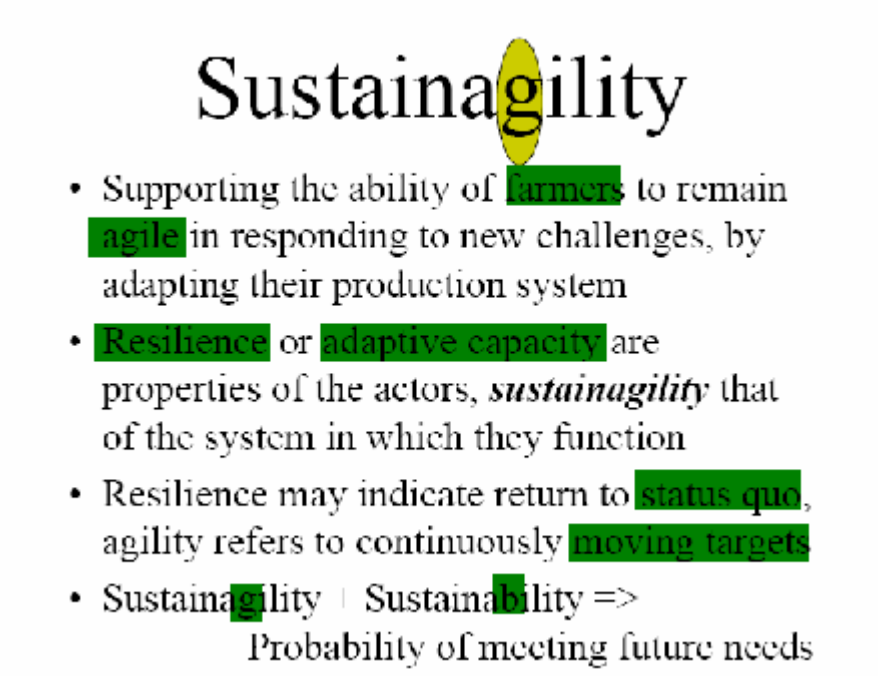


Figure 1. Sustainagility as the complement of sustainability at multiple scales

Sustainability at any scale (meeting current needs without compromising the future) can be achieved by persistence of all subsystems, or by maintaining options for change ('sustainagility') at the lower levels. on learning in the realities of the landscape as well as by reflection, analysis and synthetic models. The way multiple spatial and temporal scales relate to multiple stakeholders, objectives and interests isn't just an afterthought, but is the core of the problem to be investigated.

Sustainagility: Properties of a system that support actors to cope with change, to be adaptive and resilient.



Picture 1: A small town in W. Australia shows that continuous change is a key characteristics of the rural as well as urban landscape – but it involves cross-sectoral switches that rely on more advanced forms of human and social capital than we usually consider in 'agricultural research'

The science of both sustainability and sustainagility is still young, and depends on learning through direct engagement in the 'action', testing ideas at scale in the real world, as the scaling rules for experiments' are unknown. Rather than sitting in the ivory tower of independent research, the researchers and their concepts and constructs are part of the overall dynamic and need to be cognisant of their evolving roles. The interface of knowledge and action for the various stakeholders and actors can be described as 'boundary work', done by 'boundary agents' and leading to 'boundary objects'.

Advise for boundary work at the interface of local, public/policy and scientific/ modelers ecological knowledge. Boundary objects making replication easier, but not leading to blueprints. Tropical forest margins have many stakeholders, who all plan and justify their actions based on their knowledge, while learning in the process. Three main groups of stakeholders are: local people, government and associated leaders of public opinion and scientists. If science is to help in enhancing the stability of forest margins, reducing poverty and securing long-term conservation of forest resources, it has to communicate effectively with the two other knowledge-action pairs, as well as with the many shades of opinion within their group. In more than ten years of work in the tropical forest margins, the ASB-Partnership has tried various approaches. A recent effort to take stock, reflect on what has worked well and what the main challenges are, distinguished:

(i) Local ecological knowledge or LEK, embedded in local context.

(ii) Public space/policy ecological knowledge or PEK, concerned with short-term 'impact'.

(iii) Scientific or modelers' ecological knowledge or MEK, seeking generic 'mechanisms'

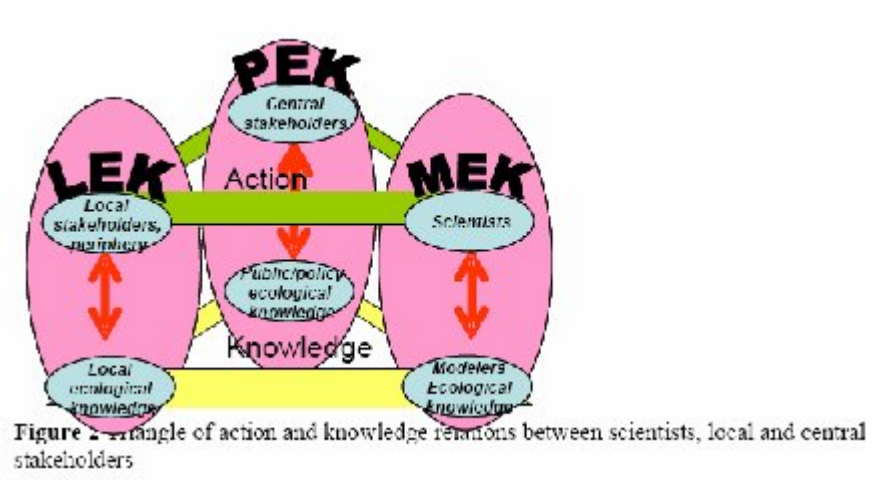


Figure 2 – Triangle of action and knowledge relations between scientists, local and central stakeholders

Two simple approaches have not worked:

(i) Scientists + farmers generating new technology will not in itself lead to forest conservation.

(ii) Scientists (or NGO advocates) advising policy-makers on how to handle forest margins for global benefits.

It appears that real progress will have to engage all three K□A pairs, but how? What can independent scientific enquiry add to an already complex situation? Management of the science – action boundary is needed for free flow of ideas, but how far will current levels of 'control' by funders and regulators have to be relaxed before creativity gets a chance? How can multistakeholders negotiations make progress in the midst of conflicts and widely divergent ambitions? Dynamic knowledge-action linkage may need to build a shared understanding of the landscape and a facilitated process of negotiations, in a 'safe space' protected from external interference, initially. How can 'boundary work' in such settings be done effectively?

2.0 VIRTUES AND RISKS OF INDEPENDENT SCIENTIFIC ENQUIRY

Linking newly acquired or well-established knowledge with actions for sustainable development can only work where 'lack of knowledge' is among the key constraints. In the past the model ('version 0') where science leads to international public goods that will be spontaneously taken up by well-intended private sector or public institutions had its advocates. With an increase in the two-way interaction between science and practice, however, uptake of results increased, alongside direct rewards for scientists who promised to deliver exactly what was demanded. Such 'demand driven' research, may require some form of protection from interference. Institutions managing the semi-permeable boundary arose, stimulating the flows of ideas but protecting science from 'interference'. ('version

1'). In fact, in the application of new knowledge the complexity of local stakeholders and the scarcity of 'win-win' solutions, make that uptake of new ideas requires negotiations along the various tradeoffs ('version 2').

Trade-offs increase the complexity for the 'boundary agents', who may need to understand and manage the biases in access to external knowledge by less-empowered local stakeholders. In confronting these models with the recent experience in developing countries, a fourth model appeared ('version -1') in which there is no 'boundary problem', as there is no independence of research. Only statements supporting the status quo will pass the acceptability test. This is the version that has dominated in human history, and has only been slowly (and partially…) abandoned in some societies.

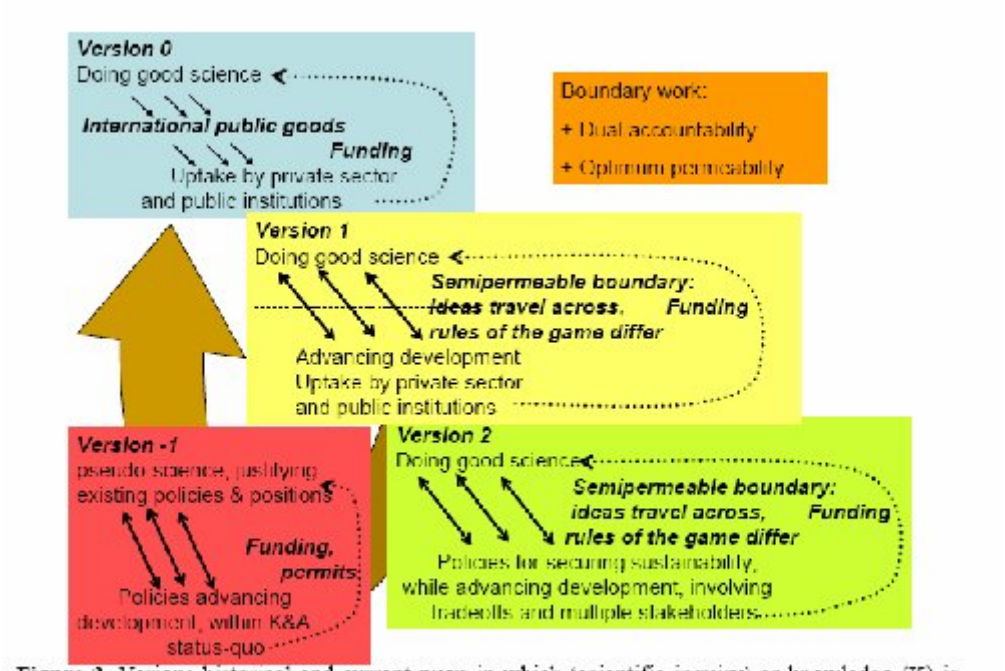


Figure 3. Various historical and current ways in which 'scientific inquiry' or knowledge (K) is linked to policy and development action (A)

The linkage between knowledge and action thus needs to be evaluated as a two-way process in which the capacity for scientific enquiry to come up with new analyses of problems and potential solutions is dependent on the arrangements at the boundary: complete independence will lead to missed opportunities for early application, strong control will suppress independence.

Management of the boundary is urgent and may require more explicit recognition and institutions than currently exist.

3.0 MULTI-STAKEHOLDER NEGOTIATIONS IN THE KNOWLEDGE+ACTION WORLD

The 'Negotiation Support System' was developed by ASB scientists to assist local communities in the forest margin and government authorities to step outside of their history of conflict and agree on secure tenure for 'squatter' communities in exchange for protection of the remaining forests and transformation of monoculture to multi-strata coffee gardens. It engages all in the creation of new 'reality' in the local context, challenging existing paradigms. For example, in the governments initial mind all types of coffee destroy watersheds and only natural forest or trees planted by foresters can secure for water-flows. Scientific data analysis helped to create space for change, at least at the local level. Subsequent change at the central level will require the engagement of both these local and scientific stakeholders, to address the rationale and formats of regulation and create space for learning. In fact this example shows a 'new' way for scientific knowledge (KSCI in fig. 4) to influence action at the public/policy level APOL. Previous approaches had focused on pathway 3 (scientists advising policymakers on what to do) and pathway 1 (scientists assisting policymakers to learn and chart their course of action). Pathway 3 rarely works, pathway 1 requires 'boundary organizations' to manage the interactions. A 4th pathway, aims at 'empowering' local stakeholders in their interaction with central policy knowledge/action pairs.

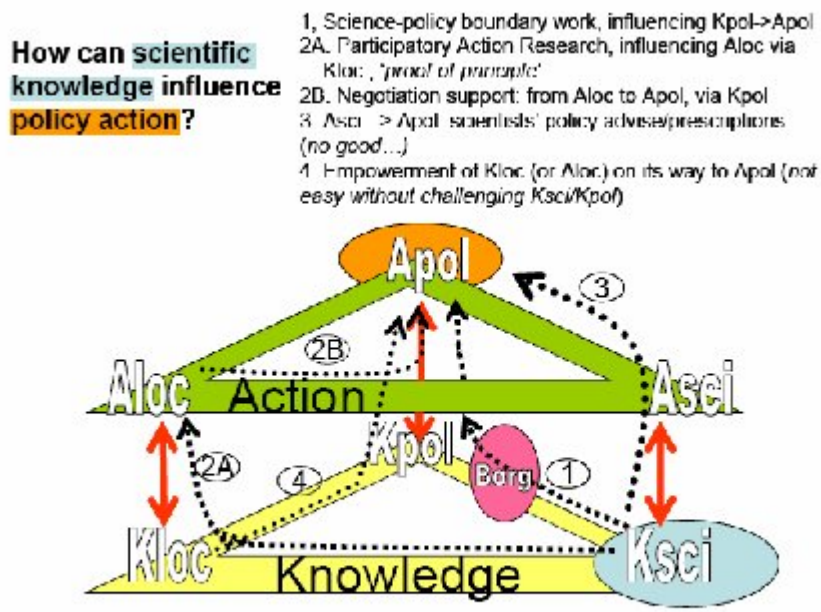


Figure 4. Various pathways for linking scientific knowledge (K_{sci}) to central policy action (A_{pol})

Where existing policy has a monopoly over the use of 'science' to justify its positions, this may not work. Pathways 1 and 2 are not mutually exclusive, and may well

be tried in conjunction. Assisting change at local level probably lowers the threshold for assisting change at more central level – as long as it is not seen as too much of a 'threat' for the powers that be.

Combining pathways with shortcuts into the public debate may work, depending on the urgency of the issue Isn't all this 'natural resource management' work too site-specific for 'international public goods' production? Replicability can be obtained via 'boundary work' simultaneous at local and central level, leading to linked 'boundary objects' and through training of 'agents' with competence and skills.

4.0 TEN POINTERS IN PREPARING FOR 'BOUNDARY WORK' ON 'SUSTAINAGILITY'

(v) Expect the more complex case of multiple actors with their associated knowledge, contesting at both A and K levels, all using their own version of 'history' as justification; on this basis, never underestimate nor overestimate the ability of stakeholders to set their own course of action.

(vi) Engage in interdisciplinary/collaborative dialogues and consultations with stakeholders. Create open, safe space for intellectual enquiry: appreciate diversity, as long as it does not clash; refrain from value statements about other K; respect community norms and rules in use.

(vii) The meaning of words lies in the context of their use: don't trust that the meaning of the same words is the same for different groups

(viii) Learning will often require the direct experience and empirical confirmation that alternative options do really exist: salience ('so what' outcomes), credibility ('how does it work' mechanisms) and legitimacy ('here, now and us' context, absence of foreign agenda's)

(ix) Provide time for trust building : often a technical entry point can help to provide legitimacy to your engagement willingness to listen and answer questions of local stakeholders goes a long way to establish a 2-way relationship

(x) Every type of boundary work requires double accountability, in moral if not formal sense; ensure backup and understanding at higher levels, as there may be times that the 'safe space' isn't quite so safe. Organisations may need to 'embed' boundary agents in appropriate structures and provide incentives to individuals to go beyond the call of duty, exploring ways of continually improving practice, encouraging people to listen

(xi) Guard the permeability of the boundary: 'ideas' can flow freely, 'control over what is true'; when 'politically incorrect' views or conclusions emerge, clarity is needed on the separate domains for empirical/scientific and public/domain knowledge

(iv) The K sharing may aim not for maximum clarity (the researchers' aim) but *optimal ambiguity:* multiple K level interpretations can coexist, as long as they do not clash at the A level

(v) Live and walk the talk about separating scientific K from influencing conclusions: "although I personally had hoped otherwise, the outcome of the analysis/experiment is..." Ensure that content/substance and process of engagement are compatible and maintained

(vi) Explore jointly how KA linkages may have co-evolved, once there is awareness and appreciation of the relativity of all knowledge systems; Note that process is as much

important as the technical content/substance of the boundary work. Build a matrix for measuring program success.