STRENGTHENING CAPACITY FOR SOILS AND LAND MANAGEMENT

August B Temu,
World Agroforestry Centre, P. O. Box 30677 Nairobi, Kenya. a.temu@cgiar.org

Abstract
The vitality soil is an imperative for the renewal of natural resources, and the sustenance of life on earth. Living organisms play a major role in sustaining the productivity of soils. This mutualism is a fundamental principle that must be adhered to in natural resources management. The greatest threats to food security arise from land degradation, a process that can easily be tamed. However the human and institutional capacity to manage and sustain the productivity of soils and land is quite weak in many developing countries. Part of the problem lies in the way soil science is communicated, while most of it lies in weak policies, inadequate research, and poor knowledge management. While fertilizers are often seen as solutions to low fertility, recent thinking points to the need to look at integrated soil and land management systems that consider biological organisms and processes, landscape architecture, soil chemistry, soil physics and climatic conditions. All these have to be considered in the context of the social and economic milieu. In this paper, we analyse the fundamentals for building soil and land management capacity. We suggest that high priority is given to human and institutional capacity in all aspects of policy, research, education and practice. We identify the need for nationwide soil and land governance mechanisms, and urge strong communication and synergy among different sectors and stakeholders.

Keywords: Capacity building, soils and land governance, integrated soil management

Introduction
In theory, all soils are good provided they are used for the purpose they are best able to support. But when farmers distinguish good from bad soils, they are looking at soils from the perspective of raising crops and livestock. Pastoralists would be interested in the ability of soils to raise fodder, while the forester is happy if trees and shrubs can grow on it. To the roads engineer the ease with which soils can be compacted and stay so assures him of road stability. This is very different from what the agricultural engineer who wants soils that are easy to work using agricultural machines. We could go on and define the needs of different groups. Our focus though is on soils for agricultural productivity: what needs to be known, by whom and how do we achieve that?

Soils are living systems with complex life cycles and life forms. The whole paradigm of renewable natural resources depends to a large extent on living soils. If soils lose their vitality they would not be able to support different life forms. Fortunately, one of the greatest assets in soils is that they can be renewed, thus becoming productive in perpetuity, at least in theory. Our ability to manipulate the physical, chemical and biological components provides a multitude of options for soil amendments. Thus living organisms contribute to soil vitality and vice versa. Sadly soils can also be damaged by natural or anthropogenic actions to such an extent that the costs of
renewal would be prohibitive. Thus we need to know a lot about the vitality of soils, threats of degradation and methods to regenerate soils and landscapes. Food security in the world will depend to a large extent upon the attention we will pay to sustaining soil productivity and overall land regeneration. This is because most arable land is already put into use.

**What capacity is needed?**

There are four cardinal niches where knowledge is required. These are:

- To formulate appropriate policies and institutions to conserve and manage soils and land;
- To generate more knowledge and invent technologies on soils through research;
- To empower individuals and institutions with knowledge and skills; and
- To apply knowledge and technologies to improve land management

Thus in building capacity, we need to target these four niches. The four are interrelated as shown in figure 1.

![Figure 1. The four niches for capacity building](image)

To build capacity in all the four areas we must have a clear vision, mission and objectives for each of the identified groups. In addition, an overall vision is needed and that is:

*Productive land, supporting and enhancing livelihoods and the environment sustainably.*

The mission is:

*To establish effective policies and strong institutions with the capability to develop and implement programmes that will enhance and sustain land productivity.*

Our objectives would therefore be:
• To improve the capacity of policy, research, education, development institutions and farmers in soils and land management; and
• To facilitate inter-institutional communication and synergy of actions

The tasks of institutions are inter alia:
• To understand the link between soil/land management and poverty alleviation, food security and environmental sustainability (long-term dynamics from time series datasets);
• To build human capital with competence (knowledge, skills and attitudes) to effectively strategize and manage land resources; and
• To build up and apply a body on knowledge that is responsive to societal needs (monitoring and evaluating systems, policies and actions).

Specifically, the following needs are prevalent:

Research institutions need to understand research capacity needs; develop collaborative research strategies and programs across institutions; link research processes and results with education and development and link climate change dynamics with land productivity. There is a need to build up national soils and land databases.

 Educators need to improve the INRM content of educational programmes (curricula); improved learning materials; improved delivery capacity, cross-disciplinary synergy and communication, and linking education with research and development.

Development organizations need to understand farmers’ needs; improve policies and institutional arrangements/programmes; develop scaling up strategies for land management technologies; train change agents; assess land health and impact on livelihoods and identify research questions.

**Capacity building strategies**

There are numerous ways of building soils and land management capacity. The most critical factor is that of ensuring that the farmer acquires the necessary knowledge and skills, so in building capacity we must start at the farm level. The key question there is ‘How do we ensure that the right knowledge reaches the farmer and is applied? To begin with, we must acknowledge that farmers are both a source and recipients of knowledge. Their knowledge is contextual and without our understanding of it, it would be difficult to work out realistic solutions to problems they may be facing. The capture of local knowledge is therefore the first step in solving soil and land health problems.

A synthesis and analysis of local knowledge from different areas combined with scientific knowledge provides the information on knowledge gaps, institutional weaknesses and policy deficiencies. It is from here that we can build the appropriate research questions and interventions in each of the niches identified above. Depending on the identified capacity needs, we can apply an appropriate combination of the following strategies to build capacity in each of the niches:

• Farmer –to farmer knowledge sharing
• Farmer and extension worker training
• Posters and fliers
• Field demonstration plots
• Focus group discussions
• Strengthening formal education systems
• Developing learning resources that support teaching
• Group training courses
• Roundtable discussions (e.g. with policy makers etc.)
• Policy briefs
• Colloquia
• Individual or group mentoring
• Postgraduate education and thesis research
• Postdoctoral and Senior fellowships
• Joint project management
• Networking (consortia, cooperatives, associations etc.)

Interest in soil science

Perhaps the greatest challenge to soil science capacity is the way it is presented. We often do not present the issues that we are dealing with, because in our own way we see the root causes of problems as the soil fertility or degradation problems. Thus we tend to think and work within narrow limits (like soil science associations) where reductionism prevails and the big picture is lost. Without prejudice to the importance of scientific associations, it is necessary to put the problems in context. For instance we must answer the question ‘who else is interested in what we do and why? For the farmer, we want to improve crop yields. Likewise we would be solving problems such as the ones in the list below for specific clients.

• Management of water quality
• Regenerating soils and landscapes
• Improving the quality and markets for (sale and buying of land) – assisting with land capability classification would change the markets for land!
• Improving biodiversity
• Capturing and selling carbon
• Converting human and animal waste to wealth

With this approach we should be able to develop projects that are much more interesting from concepts of this nature than the usual ones that focus of fixing a particular element that is probably missing in a given soil.

Challenges

The most important challenge is that of the multitude of sectors that deal with soils. Figure 1 provides an example. These sectors are often not linked in their decision making or operations. They may also have opposing interests and needs. So if there are no common mechanisms for policy on soils and land governance the challenges of achieving harmony from actions taken by different sectors are enormous.
The challenges of building capacity in such a multi-sectored environment are multiplied. In many countries there are not specific institutions mandated to build such capacity, and unfortunately teaching institutions tend to deal only with their own students unless they are invited and supported to train others. Thus there is a capacity building vacuum for soils and land management. For instance soil science is only taught in faculties of agriculture and forestry, while the land-use sector falls entirely outside forestry and agriculture. How are all sectors expected to reach and apply soils knowledge?

International research organizations tend to undertake supply-driven capacity building where what is being communicated is the research findings, often devoid of the problem context. We are often not addressing the real identified needs. Such efforts are also episodic as they are only implemented when donor resources are available. This is unsustainable. There is a need for good coordination across suppliers of capacity and the consolidated demand from various sectors and stakeholders. Furthermore, the focus on NARIs and universities often misses the real clients that are farmers, policy makers, ministries and private industry. The long-term impacts of international capacity building efforts are unclear, and often not measured.

**Collaboration**

Collaboration is a form of capacity building because it enables individuals and institutions to fill in missing knowledge and skills. The following mechanisms are suggested:

- National, regional and global networks and contacts
- Cross-disciplinary communication and exchanges
- Integrated knowledge management – merging knowledge systems as a way of achieving economies of scale.

**Conclusion**

By far the greatest need is for a coordination mechanism at national level to assure minimum standards in terms of policies and practices in soil and land management. Inter-institutional coordination and collaboration must be part and parcel of this mechanism. Building of capacity for soil and land management should take a strategic pathway where the larger questions of livelihood and environmental sustenance are
used as frames of reference. Regional and inter-institutional cooperation is inevitable to enable building and better use of expensive facilities and scientists. The bottom-line though is to ensure that farmers have the right knowledge and skills to make their farms sustainably productive.