

8.6.1 Sustainable Agriculture and Natural Resource Management

As a means to address food security, livelihood improvement, and land and resource degradation, “sustainable agriculture” (SA) technologies and related natural resource management (NRM) practices have often been promoted in both favoured and less-favoured landscapes. A formal definition often characterises sustainable agriculture having five major attributes: it is resource-conserving (of land, water, plant and genetic resources), environmentally non-degrading, technically appropriate, and economically and socially acceptable. As a practical matter, these technologies, practices and systems are often considered to 1) use less external off-farm inputs such as fertilizers, pesticides, and mechanical inputs; 2) use improved management techniques, and 3) employ locally available labour and natural resources as well as externally purchased inputs in complementary and synergistic fashion. Sustainable agricultural practices are often adopted by farmers as a means to address soil erosion, water scarcity, loss of forest resources, and other examples of increased natural resource degradation and scarcity.

Water Management in Irrigated and Rain-fed Areas

The fact that rural households commonly face problems of water scarcity means that perhaps in no other area are management improvements more important than in improving water management. It is useful to distinguish between improved water management in irrigated versus rain-fed areas. In irrigated areas, one of the key developments over the past 20 years has been the growth of “participatory irrigation management” (PIM) approaches to water management.

In the many household-level settings in *rain fed areas* where access to adequate water supplies is the main constraint to agricultural growth, increasing this access to water can be accomplished in a variety of ways. Among the most important mechanisms are improving plant water availability through reducing surface runoff and maximizing plant water uptake capacity (IWMI, 2007). This can be accomplished through practices and technologies that increase the productivity of existing water supplies (mulching, drip irrigation, improved crop management) and by capturing more water to begin with.

Joint Forest Management

Forests, like water and fisheries, suffer from chronic open access problems. Over two decades (in some countries, much longer), efforts have been made in many countries to devolve forest management to private individuals and local community groups as a way of dealing with those problems. Joint forest management systems tend to be most successful when they are characterised by: definable boundaries; the presence of scale economies in production and ease of use; when the resource is important to meeting local users’ needs; when the benefits are shared equitably; when the local community is not too heterogeneous and does not have too many conflicting interests; when local leadership has self-interests that coincide with those of local users; when the local arrangement is built on existing institutions; and when the local arrangement is sufficiently adaptable to respond to changing economic conditions, such as changing prices for outputs and increasing costs.

Co-management in Fisheries

The management of fisheries shares some of the same trends as land, water and forest management, but there are also some major differences. There has long been through involvement of national governments in fisheries policy and management, both in marine and inland fisheries. But nowhere has the failure of top-down state-led administrative

structures been greater. The current global fisheries crisis as a result of severe open access-related problems is closely attributable to a crisis in governance (World Bank, 2004).

Decentralisation of Natural Resource Access and Management

With regard to common property and open access resources as a whole, one of the central themes is the widely acknowledged failure of top-down centrally administered approaches to resource management (particularly for common property resources). In response to these limitations, one of the key developments over the past two decades or more – and one pertaining to land, water, forest and fisheries management at all levels – has been growing commitment to the involvement and empowerment of private resource users and local communities in managing resources that have been allocated by the state or by statutory law.

Tradeoffs in Sustainable Resource Management

It has been common in much of the development literature and among development practitioners to highlight “win-win” outcomes (higher household production and improved food security along with lower poverty), or even “win-win-win” outcomes (lower environmental degradation as well).

8.6.2 Enabling the Poor to Take Advantage of Evolving Market

One of the means by which the poor can potentially improve resource access and sustainable management is through market-based mechanisms as they apply to land, water, forests and other natural resources. The growing interest in markets for natural resources and environmental services stems from several factors. Market mechanisms are, in large part, self-regulating and thus provide an alternative to more “top-down” and bureaucratic and institutionally-based resource allocation mechanisms which are prone to arbitrary and inequitable decision-making, are influenced by the distribution of political power, and, in many cases, are dominated by graft and corruption.

Payments for Environmental Service

Paying for the provision of environmental services is a recent policy innovation that is attracting much attention in both developed and developing countries. The innovation involves a move away from command-and-control environmental policies and towards the use of market incentives to obtain more efficient environmental outcomes, and rewarding providers of environmental services that did not receive compensation in the past.

Water Pricing and Water Markets

Water is a unique natural resource in many respects – due to its mobile nature, the extent to which rights to its access may (or may not) be tied to land, in the mix of public goods and private goods that its use entails, and in other respects. In the current environment facing many nations of increasing water scarcity due to expanding populations, rising food demands, increasing commodity prices and climate change, there is increasing interest in alternative mechanisms to solve chronic problems associated with water access, allocation and management. This has led to growing interest in water pricing, water markets, and transferable water rights as mechanisms for more efficiently allocating and better conserving scarce water resources.

The introduction of *water pricing* typically has one of two primary objectives – increasing incentives for conservation by having the price of water reflect its scarcity value, and

raising revenues for construction, operation and maintenance of water supply and irrigation systems.

Water markets typically refer to the formal market-based exchange of water rights (as opposed to spot water markets which may be used to temporarily transfer water use among neighboring farmers or other members of a water users' group, for example).

Forest Certification and Markets for Non-Timber Forest Products

Forest certification was developed as a strategy to address deforestation in tropical forests, but it is not a strategy *per se* to combat deforestation; rather, it is an instrument to promote sustainable forest management (SFM) and informed consumption of wood and other forest products (Simula, 2005).

Certification, in some countries, also extends to *non-timber forest products* (NTFP's) – forest-based food, fuel, construction materials and medicines – on which the rural poor are often as (or more) heavily dependent than they are on timber.

Markets for Seeds and Crop Genetic Resources

Market-based approaches are having major impact on both the development of crop genetic resources, as well as the dissemination of seeds. In recent years there has been a major shift in funding sources for plant breeding from the public to the private sector. The public commons of genetic resources is being increasingly privatized through more clearly defining and implementing intellectual property rights (IPRs) on plant genetic resources. Intellectual property rights over plant genetic resources can take different forms, from patents over genes and gene constructs, to varying forms of plant breeders' rights which may or may not allow farmers to save and reuse seeds.

8.7 SUMMARY

Natural resources vary in the degree to which they are “naturally” available versus being altered by human actions. Resource quality and quantity are heavily influenced by human behaviour and the sustainability – or lack of sustainability – of management practices. Current concerns about global climate change address some of the most basic aspects of ecosystem processes and regulation are of particular concern. Land quality is affected by degradation, or enhancement, as a function of prior use and current management patterns. Water availability is highly influenced by irrigation infrastructure and management in many regions, while water quality is affected by human actions which may lead to soil erosion and sedimentation, and pollution by agricultural, industrial and human waste. Agricultural genetic resources have been influenced by genetic selection and manipulation by both farmers and scientists over many generations.

8.8 TERMINAL QUESTIONS

- 1) What do you understand by natural resources, access and its importance?
- 2) Discuss various challenges to improve the access of natural resources.
- 3) Give an account of emerging threat in accessing natural resources.

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