

## RESOURCE SUSTAINABILITY: THE DEVELOPMENT CHALLENGE IN RESOURCE-POOR AREA

*(Keberkelanjutan Sumberdaya: Tantangan Pembangunan di Kawasan Miskin Sumberdaya)*

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### ABSTRAK

Keberlanjutan (sustainability) menekankan pada hubungan antara lingkungan dan manusia dengan tujuan mencapai kelestarian lingkungan serta meningkatkan kesejahteraan masyarakat. Sayangnya konsep ini berkaitan dengan menurunnya ketersediaan sumberdaya alam yang disebabkan oleh eksploitasi yang berlebihan. Masyarakat yang terlibat eksploitasi sumberdaya alam secara langsung serta yang kesejahteraannya, baik secara langsung maupun tidak langsung, sangat tergantung pada sumberdaya alam, adalah mereka yang hidup di daerah pedesaan. Masyarakat pedesaan seringkali kesulitan dalam membuat keputusan mengenai sumberdaya alam, dimana di satu sisi, mereka perlu untuk memanfaatkan sumberdaya alam, tetapi di sisi lain, mereka perlu melestarikan kapasitas produktif dari sumberdaya tersebut untuk menopang kesejahteraannya. Situasi ini menjadi lebih buruk jika ketersediaan sumberdaya alam di kawasan tersebut sudah sangat terbatas, karena hal ini akan meningkatkan proses eksploitasi. Sehingga, pembangunan berkelanjutan di kawasan pedesaan adalah sebenarnya mengenai ketahanan pangan (food security), yang seringkali diperoleh dengan mengorbankan lingkungan. Salah satu contoh kawasan miskin sumberdaya alam adalah Karst Gunung Sewu. Ketahanan hidup masyarakat Gunung Sewu sangat ditentukan oleh ketersediaan sumberdaya alam di lingkungannya, sehingga adopsi mereka terhadap suatu sistem pertanian tertentu, dapat menunjukkan bagaimana mereka berupaya untuk mengimbangi kebutuhan-kebutuhan agar dapat terus hidup. Pertahanan untuk terus hidup dengan hanya memanfaatkan sumberdaya yang terbatas ini, menunjukkan bahwa pemanfaatan sumberdaya alam yang berkelanjutan di daerah pedesaan terutama di kawasan miskin sumberdaya alam merupakan suatu tantangan pembangunan di kawasan pedesaan. Masyarakat Gunung Sewu telah mengembangkan cara-cara tradisional dalam memanfaatkan serta melestarikan sumberdaya alamnya untuk memastikan adanya efisiensi dalam pemanfaatan sumberdaya untuk produksi pangan. Strategi pemanfaatan lahan yang dipilih dipengaruhi oleh kondisi sosio-ekonomi termasuk budaya, sedangkan strategi untuk meningkatkan pendapatan lebih dipengaruhi oleh kondisi fisik lingkungannya (Sunkar, 2008).

Kata kunci: Keberlanjutan, pengelolaan sumberdaya alam, kawasan miskin sumberdaya alam, pangan, Karst Gunung Sewu

### SUSTAINABILITY

Over the past two decades, the concept of sustainable development has become a popular catchphrase and the focus of much debate on public policy. The *Brundtland Report* (WCED, 1987) served as a milestone. The *Report* defines sustainable development as development that “meets the needs of the present without compromising the ability of

future generations to meet their own needs” (p.43), and has received worldwide acclaim. It has generated considerable academic research, but as yet, this has not necessarily resulted in a more sustainable environment. On the other hand, the term has produced a plethora of literature and discussion as to the definition of sustainable development, some components of which can be seen in Table 1.1 below.

Table 1.1. Main Components of Some Sustainable Development Definitions

Definition	Message	General Objective	Difficulties
Brundtland (1987)	Intergenerational legacy Constraint development	Development on needs only with minimal damage basis	How do you measure needs of the future? Does not address scale?
Pearce <i>et al.</i> (1990)	Equal access to resources across generations	Acknowledge the limits of resources in equitable intergenerational manner	Who decides and organises? Evidence base?
Wackernagel and Rees (1996)	Equitable living Environmental protection	Acknowledge the limits of resources in equitable manner	Who decides and who organises? Evidence base?
Robert <i>et al.</i> (1997)	Limits to natural resources	Acknowledge the limits of resources	What are the socio- economic effects of this?
UK Department of Environment, Transport and Regions (1999)	Social progress, economic growth, environmental and resource protection	Balance of interests	Compromise and conflict – who decides priorities?
Girardet (1999)	Citizen need and well-being Environmental protection	Equity and avoid damage to others	Who organises the operating system?
National Strategies for Sustainable Development (2000)	Socio-economic development Intergenerational legacy	Similar to Brundtland but narrower base	How do you measure needs of the future? Does not address scale?

Source: Mawhinney (2002)

Despite the range of definitions attached to sustainable development and sustainability, all share common aims, particularly maintaining the integrity of nature and increasing people's welfare. Specifically, development must:

- 1) Create a biophysical environment, which is able to continuously support the lives of the people. This involves the conservation of essential ecological processes.
- 2) Be able to give significant benefits to the people living in an area. This involves the issue of human ecology/welfare.

#### TYPES OF CAPITALS IN SUSTAINABILITY

Most of the definitions of sustainable development can be grouped as either an economist's or an ecologist's perspective. These have given rise to an important distinction that focuses on the substitutability between economy (economic goods/manufactured capital/physical capital/human-made capital) and environment (environmental services/natural capital) known as *weak* and *strong sustainability*. This is a debate evident in much of the

literature on sustainable development (Daly, 1995; Morse and Stocking, 1995; Pearce *et al.*, 1990).

The difference between the two types of sustainability lies in the type of capital. Human-made capital is capital generated through economic activity, through human ingenuity and technological change, including all infrastructures, purchased goods and manufactured items such as tools used to support livelihoods. Natural capital consists of non-renewable and renewable resources as well as environmental services including natural environment (topography, soil and water), livestock, crops and other plants that together support livelihood (Stocking and Murnaghan, 2001; Berkes and Folke, 1992). Pearce and Warford (*in* Morse and Stocking, 1995) added a third "middle-way" economic perspective on sustainability, i.e. *moderate sustainability* where constant capital cannot be maintained but has to be protected from irreversible decline. However, this has not generated much attention in the literature.

Weak sustainability requires that the total volume of natural and human-made capitals be sustained. Weak sustainability assumes that to achieve sustainability, a loss in natural capital can be compensated by increasing human-made capital through investment and technology (Solow,

2000; Destais, 1996). Strong sustainability suggests that the existing stock of natural capital must be maintained and enhanced because the functions it performs cannot be duplicated by human-made capital. Both types of sustainability imply a centralised decision-making process and a decision-maker who decides on behalf of society. Therefore the decentralised decision-makers at family level would not and need not make the choice between weak or strong sustainability.

Although it is perhaps not necessary to distinguish the type of sustainability, it is important to mention the types of capital involved. According to Daly (1990), it is impossible for human ingenuity to create human-made capital without support from natural capital. Furthermore, Berkes and Folke (1992) believe that it is impossible to approach sustainability by only focusing on the interrelationship between these two capitals. Thus they have added a third dimension, which they refer to as *cultural capital* which they define as “*factors that provide human societies with the means and adaptations to deal with the natural environment and to actively modify it*” (p. 2). This includes the various ways in which societies interact with their environment, including cultural diversity (Gadgil, 1987). Diverse cultures hold the key not only to diverse adaptations to the environment, but also to a diversity of worldviews, philosophies and ethics that underpin these adaptations. Many resource-use problems can be traced in part to some of the same elements that are assigned to cultural capital, such as ethics, cultural diversity, religion and social institutions (Berkes and Folke, 1992).

From a system perspective, the three capitals are strongly interrelated as they shape the way people interact with their environment and their use of natural capital. In effect, sustainability focuses on the relationship between environment and people and is now broadly accepted by global policy makers and commentators as a fundamental concept that should underlie all resource management. Acceptance of this stance requires a shift in emphasis from the physical resource base *per se* to a fuller recognition of the social context within which resources are used. Of course, calls for such a shift are not new (see, for example, Blaikie, 1995) but the need to make this shift is now more broadly accepted as urgent.

## SUSTAINABILITY AND NATURAL RESOURCES DEGRADATION

The concept of sustainable development addresses a concern for degrading natural resources. Therefore, it is understandable that much research on sustainable development focuses on less-developed countries, where most of the people live in rural areas and whose livelihood, for the most part, depends directly or indirectly on the

exploitation of natural resources. These people often face difficult trade-offs in decision-making about natural resources. On the one hand, the people need to exploit natural resources but on the other hand, they need to conserve the productive capacity of these resources to sustain their livelihood. Lack of alternatives as well as competition for resources often drives them into poverty. Inevitably, this in turn tends to encourage farmers to focus on immediate needs rather than on those benefits that may materialise in the longer term.

According to Pillai (2001), the fundamental premise of sustainable development involves a two-way link between poverty and degradation, in that poverty is both a cause and an effect of environmental degradation. This alone however is simplistic as research suggests that both poverty and environmental change have deep and complex causes as evidenced by Lumley (2002), Shiferaw and Holden (1999), Cavendish (1999a and 1999b, 1998), Brouwer *et al.* (1997), Rahman (1995), Tiffen (1993) and Jodha (1991, 1986). Despite considerable research on poverty-environment linkages as shown by a thematic bibliography on poverty, environment and sustainable development prepared by the World Bank (Pillai, 2001), the nature of the link between poverty and environment (although often mentioned in debates on sustainable development) is seldom explored. However, Vosti and Reardon (1997) who edited a book on sustainability, growth and poverty alleviation concluded that the links between poverty and environment are determined by the behaviour of rural communities and households, since they are the immediate users and managers of rural ecosystems, albeit at a subsistence level.

Poverty is often measured according to income, consumption or nutrition criteria, based on a benchmark minimum income sufficient to attain minimum caloric intake or to buy a diet just sufficient, given a specific regional diet level and composition (BPS Kab. Gunungkidul and Bappeda Gunungkidul Regency, 2000; BPS and UNDP, 1999; Greer and Thorbecke, 1986). However, this measurement of poverty cannot be applied in all areas due to different socio-economic conditions. Hence, it is inadequate to say that the level of welfare is the only means of measuring poverty. In response, Reardon and Vosti (1995) argue that both environmental change and poverty are multifaceted and should be decomposed into a number of categories as each type of environmental change and poverty affects poverty-environment relationships in a different way. They define poverty according to those assets in which households are poor, i.e. poor in: natural resources, human resources, on-farm resources, off-farm resources, community-owned resources, and social and political capitals. This perspective is similar to that of Stocking and Murnaghan (2001) who also note that such capital assets affect farmers' decisions on land management and term these as *sustainable rural livelihoods framework*.

Food is one of the factors that determine why the poor take decisions to spread risk and how they finally balance competing needs in order to survive. This is shown by their adoption of a specific farm system that defines the way a rural community copes with the environment to produce food. Therefore, when talking about sustainable development in a rural area, we are really talking about food security. It may be argued that food security is often achieved at the expense of environmental degradation. However, Chambers (*in Saad*, 1999) argues that the poor have a vested interest in conserving their natural resource base, for both food security and livelihood reasons. In line with this, De Waal (1989) claims that the people of Darfur in Sudan chose hunger during periods of famine in order to save seed for planting and cattle for breeding to preserve their assets, and thus assure their longer-term livelihoods. Also in Africa, Corbett (1988) found that preservation of assets takes priority over meeting immediate food needs, when all other options have been exhausted. Similarly, a number of studies of famine in South Asia have suggested that people who live in conditions which put their main source of income at risk, develop self-insurance strategies to minimise risks to their food security and livelihood (Jodha, 1981, 1978, 1975; Morris, 1975, 1974).

Therefore, to understand how farmers make decisions regarding their environment, the central importance of farmers' concerns including their problems, interests and goals must be clarified. Douglas (1989) considers that in small, resource-poor rural households faced with the primary need to survive and satisfy basic needs, socio-economic circumstances are generally more important considerations in designing effective conservation methods than the constraints imposed by the physical environment. This reinforces the point that conservation efforts must be designed with local social-economical consideration in mind. The causes of environmental degradation for example, are firmly rooted in the socio-economic, political and cultural environment in which land users operate (Stocking and Murnaghan, 2001; Urich, 1995; Biswas *et al.*, 1990; Blaikie *in* Adams, 1990; Green and Heffernan, 1987). Consequently, while there is a need to incorporate the natural environmental, social, economical and political understanding into policies for sustainable development, planning for sustainable development must focus on the power of local people to manage the environment on which they depend. A research by Sunkar (2008) will be summarized below to illustrate this point.

### SUSTAINABILITY OF RESOURCE USE AND LIVELIHOOD STRATEGIES IN GUNUNG SEWU KARST

Farmers in an agricultural, resource-poor area such as Gunung Sewu Karst, within the island of Java, Indonesia, are faced with the primary need to survive and satisfy basic needs. It may be argued that in a resource poor area, environmental degradation is speeded up because people need to use the resources to satisfy their basic needs. However, a number of studies on livelihood strategies (Chambers *in* Saad, 1999; De Waal, 1989; Corbett, 1988; Morris, 1975, 1974 and Jodha, 1981, 1978, 1975) showed that households faced with risks to their food security will plan strategically to minimise risk. In Gunung Sewu, only 1.23% of farmers are small scale and landless farmers, who would be willing to migrate outside Gunung Sewu and live in other areas, if better opportunities arose (Sunkar, 2008). The majority are happy in their work and home. This shows that for Gunung Sewu farmers, physical constraints are given conditions and they have to adapt to these. Sunkar's research (2008) confirms findings from previous research, that human adaptation strategies are as important as environmental circumstances in determining the consequences of people's interaction with the land.

Land, vegetation and soil reflect the degradation and natural rehabilitation of the Gunung Sewu area (Sunkar, 2008). The low landholding size reflects the increased size of the population as well as decreasing soil fertility. The impact of human exploitation increases the rate of degradation of the vegetation cover. This is further stressed in the conversion of hilltop forest and shrub to cultivation. Chemical analysis of the soil also revealed the low level of nutrients available for crop growth, and that clay is the major component of the soil in the valleys. The clay content reflects the effect of runoff, which suggests high erosion from hillsides.

Because of the extensive rocky desertification that has occurred, it seems impossible to return the karst to its original landscape condition. However, the ability to decrease degradation in Gunung Sewu depends on how people use natural resources, as they are very nature-dependent. Sunkar's research (2008) has shown that cultural factors, including attitude, play an important role in the choice of household strategies to cope with resource scarcity. Sunkar (2008) further stated that in areas with resource scarcities, nature is viewed as a source of survival, while the society or community is viewed as a source of safety. Socio-cultural values influence people's behaviour and shape their perception of land, soil and water. Both their perceptions of the economic and non-economic values of land, food and water form their key motivation to better manage resources.

Since the main source of survival and income in Gunung Sewu is agriculture, the farmers have developed self-insurance strategies to minimise the risk to their food security and livelihood. In Gunung Sewu, an important determinant of behaviour is the social influence from other farmers as well as that of family members. The principles above are attached by the people to their lives as a means to protect them and to make sure they can place themselves in balance with their environment. Peace and mental balance is the goal in life for a Javanese farmer.

Severe physical conditions are not seen by the population in the Gunung Sewu Karst area as constraints. In dealing with these, the people have established local adaptations, culturally, physically and socially that although with socio-economic circumstances in mind (not environmental), benefit the environment. These include: (a) more ground cover through the practice of agrosilvopasture; (b) increasing filtration and slowing surface runoff by planting trees on hillsides where erosion is greatest; (c) planting trees for future financial emergency; (d) use of a fallow period, which lets the soil rest; (e) use of livestock and household waste as organic fertilisers that are harmless to the environment and increase soil fertility. However, there are many efforts aimed toward better management of natural resources in the area. The practice of greening and plantation of teak on hill slopes, although with cultural as much as future possible financial need in mind, nevertheless, will have positive impacts on the land. Teaks that have been planted are generating good natural seedlings as found in the past. Furthermore, with respect to the low interest of the younger generation in taking up farming, this may well result in more people planting trees (Sunkar, 2008). Although these practices cannot reverse the degradation that has occurred, they are able to slow down degradation by giving a greater return to nature.

### CONCLUSIONS

The whole domain of human culture and knowledge is a critical, yet undervalued and unmeasured dimension of development and thus of sustainability. Economic and political factors often put pressure on the resource base and people are forced into land-use practices that are not sustainable.

In an area where land is the only available resource essential for human survival, society will protect it carefully and usually develop some of the best land management practices. Sunkar's research (2008) clearly illustrate that in Gunung Sewu Karst, human adaptation strategies are as important as environmental circumstances in determining the consequences of people's interaction with the land. For Gunung Sewu farmers, nature is viewed as a source of survival, while the society or community is viewed as a

source of safety. They have developed self-insurance strategies to minimise the risk to their food security and livelihood. Socio-cultural values influence people's behaviour and shape their perception of land, soil and water. Both their perceptions of the economic and non-economic values of land, food and water form their key motivation to better manage resources.

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### REFERENCES

- Adams WM. 1990. *Green Development: Environment and Sustainability in the Third World*. London: Routledge.
- Berkes F and C Folke. 1992. A systems perspective on the interrelations between natural, human-made and cultural capital. *Ecological Economics* 5: 1-8.
- Biswas AK. 1990. Environmental Modelling for Developing Countries: Problems and Prospects. In A. K. Biswas, T. N. Khoshoo & A. Khosla (Eds.), *Environmental Modelling for Developing Countries* (pp. 1-12). London: Tycooly Publishing.
- Blaikie P. 1995. 'Changing Environments or Changing Views? A Political Ecology for Developing Countries'. *Geography* 1995, 203-214.
- BPS and UNDP. 1999. *Crisis, Poverty and Human Development in Indonesia*. Jakarta: Badan Pusat Statistik.
- BPS Kabupaten Gunungkidul & Bappeda Gunungkidul Regency. 2000. *Income Distribution and Population Poverty of Gunungkidul Regency*. Yogyakarta: BPS.
- Brouwer ID. 1997. *When Households Run Out of Fuel: Responses of Rural Households to Decreasing Fuelwood Availability*. Malawi: Ntcheu District.
- Cavendish W. 1999a. Empirical Regularities in The Poverty-Environment Relationship of African Rural Households. Center for the Studies of African Economies. *Working Paper Series 99-21*.
- Cavendish W. 1999b. Poverty, Inequality and Environmental Resources: Quantitative Analysis of

- Rural Households. Center for the Studies of African Economies. *Working paper Series 99-9*.
- Cavendish W. 1998. The Complexity of the Commons: Environment Resource Demands in Rural Zimbabwe. Center for the Studies of African Economies. *Working Paper Series 99-8*.
- Corbett J. 1988. Famine and Household Coping Strategies. *World Development*, 16(9), 1099-1112.
- Daly HE. 1990. Toward Some Operational Principles of Sustainable Development. *Ecology Economy*, 2, 1-6.
- Daly HE. 1995. On Wilfred Beckerman's Critique of Sustainable Development. *Environmental Values*, 4, 49-55.
- De Waal A. 1989. *Famine that Kills : Darfur, Sudan, 1984-1985*. Oxford: Clarendon Press.
- Destais G. 1996. Economic Effects of Environmental Policies and Constraints. What Can We Learn from Computable General Equilibrium Models. In S. Faucheux, D. Pearce & J. Proops (Eds.), *Models of Sustainable Development* (pp. 87-102). Brookfield: Edward Elgar.
- Douglas MG. 1989. *Integrating Conservation into the Farming System: Land Use Planning for Smallholder Farmers, Concepts and Procedures*. London: Commonwealth Secretariat, the Food Production and Rural Development Division.
- Gadgil M. 1987. Diversity: Cultural and Ecological. *Trends in Ecology Evolution*, 2, 369-373.
- Green GP & Heffernan WD. 1987. Soil Erosion and Perception of the Problem. *Journal of Rural Studies*, 3(2), 151-157.
- Greer J and Thorbecke E. 1986. *Food Poverty and Consumption Patterns in Kenya*. Geneva: Kenya International Labor Office.
- Jodha N. 1975. Famine and Famine Policies: Some Empirical Evidence. *Economic and Political Weekly*, 10(41), 1609-1623.
- Jodha N. 1978. Effectiveness of Farmer' Adjustment to Risk. *Economic and Political Weekly*, 13(25).
- Jodha N. 1981. Role of Credit in Farmers' Adjustment Against Risk in Arid and Semi-Arid Tropical Areas of India. *Economic and Political Weekly*, 16(42-43), 1696-1709.
- Jodha NS. 1986. Common Property Resources and Rural Poor in Dry Regions of India. *Economic and Political Weekly*, XXI (27), 1169-1181.
- Jodha NS. 1991. Rural Common Property Resources: A Growing Crisis. IIED. *Gatekeeper Series No. 24*
- Lumley S, Sustainability and degradation in less developed countries : immolating the future?. Aldershot, England ; Burlington, VT : Ashgate, c2002.
- Mawhinney M. 2002. *Sustainable Development: Understanding the Green Debates*. Oxford: Blackwell Publishing.
- Morris DM. 1974. What is Famine? *Economic and Political Weekly*, 9(44).
- Morris DM. 1975. Needed - A New Famine Policy. *Economic and Political Weekly*, 10.
- Morse S & Stocking M. 1995. *People and Environment*. London: UCL Press.
- Pearce D, Barbier E & Markandya A. 1990. *Sustainable Development: Economics and Environmental in the Third World*. London: Earthscan Publications Limited.
- Pillai P. 2001. Poverty, Environment and Sustainable Development: A Thematic Bibliography [Electronic Version]. Retrieved 15 April 2006 from [http://www.sandeeonline.org/publications/bibliographies/pdf/poverty\\_environment.pdf](http://www.sandeeonline.org/publications/bibliographies/pdf/poverty_environment.pdf).
- Rahman HZ. 1995. Ecological Reserves and Expenditures Saving Scope for the Poor. In Rahman & Hossain (Eds). *Rethinking Rural Poverty: Bangladesh as a Case Study*. New Delhi: Sage Publications.
- Reardon T and Vosti SA. 1995. Link Between Rural Poverty and The Environment in Developing Countries: Asset Categories and Investment Poverty. *World Development*, 23(9), pp. 1495-1506.
- Saad MB. 1999. Food Security for the Food Insecure: New Challenges and Renewed Commitments. *CSD Women's Caucus Position Paper for CSD 8*.
- Shiferaw B and Holden S. 1999. Soil Erosion and Smallholder's Conservation Decisions in the Highlands of Ethiopia. *World Development*, 27 (4), 739-752.
- Solow RM. 2000. Poverty and Environment. In P. K. Rao (Ed.), *Sustainable Development: Economics and Policy* (pp. 235-257). Massachussettes: Blackwell Publishers.
- Stocking M & Murnaghan N. 2001. *Handbook for the Field Assessment of Land Degradation*. London: Earthscan Publications Ltd.
- Sunkar A. 2008. *Sustainability in Karst Resources Management: The Case of The Gunung Sewu in Java*.

- Unpublished PhD Thesis, University of Auckland, Auckland.
- Tiffen M. 1993. Productivity and Environmental Conservation Under rapid Population Growth: A Case Study of Machakos District. *Journal of International Development*, 5 (2), 207-223.
- Urich PB. 1995. *Resource Control and Environmental Change in the Philippines: A Case Study in the Province of Bohol*. Unpublished PhD Thesis, Australian National University, Canberra.
- Vosti SA and Reardon T (eds). 1997. *Sustainability, Growth, and Poverty Alleviation: A Policy and Agroecological Perspective*. Baltimore: Johns Hopkins University Press.
- WCED. 1987. *Our Common Future*. Oxford: Oxford University Press.