

## Microfinancial System and Sustainable Development: Are They Compatible?

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**Abstract:** In recent years, millions of poor people worldwide have benefited from microfinance activities, such as microcredit, microsaving and microinsurance, making these financial services a key-tool for development of many developing countries. At the same time, the concept of sustainable development has taken on an increasing importance in the debate about economic growth and environment. The present study tries to explore the relationship between microfinance and sustainable development in developing areas focusing mainly on environmental sustainability. Our analysis seems to suggest the full compatibility between microfinance institutions and a sustainable development path at local level, on condition that these institutions implement policies aiming to make compatible the loans they provide with the environment and that they encourage the diffusion of environmental awareness across borrowers.

**Keywords:** Microfinance, Microcredit, Sustainable development, Environment, Developing countries

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### 1 Introduction

This paper arises from our interest for two relevant economic issues: the ongoing debate on sustainable development (SD) and the role of microfinance institutions (MFIs) in economic growth of developing countries.

Although some critics argue that sustainability is an empty term, virtually all definitions of SD share the principle of equity, emphasizing the tension between the goals of economic development and environmental protection.

In this framework, the problem of environmental sustainability may be critical in developing countries. Since these countries face the first stages of economic growth, they generally employ great volumes of natural resources to increase production that can result in serious environmental damages. This condition may get worse because of the lack of regulation able to limit natural capital depletion.

Since in less developed areas many economic activities are today implemented thanks to microfinance loans, the aim of our conceptual work is to deal with the performance of MFIs in regard to the concept of SD, focusing in particular on its environmental dimension. More precisely, our attempt is to re-examine both the concept of SD and the aspects of microfinance, and second, to consider the possibility that MFIs also operates in favour of SD.

The structure of the work is the following. Section 2 examines the concept of SD stressing the reasons why environmental issues are essential in developing countries. Section 3 analyzes the role of MFIs in developing countries starting from the description of why MFIs perform better than formal credit institutions in low-income countries. Section 4 suggests some strategies to make microfinance more environmental-friendly, and section 5 concludes.

### 2 Sustainable Development, Environmental Kuznets Curve and Developing Countries

The concept of SD can be considered as a further step in the debate about economic growth and development since it focuses on non-monetary dimensions of welfare and on the need for both an inter-generational and intra-generational redistribution of productive resources, in particular, of the environmental ones (Tiezzi, 1993). SD in fact overcomes the uni-dimensional GDP to lead a new vision of development based on a multi-dimensional measure of welfare (UNDP, Human Development Report, 1991).

Starting point of the debate on SD is the definition included in the 1987 “Brundtland Report”: “*a development is sustainable if it meets the needs of the present generation without compromising the ability of future generations to meet their own needs*” (WCED, 1987). This definition empathises three key-concepts of development: future, equity, and environment (Pearce et al., 1991). Future, since the concept of SD extends the temporal horizon of analysis. Equity, since SD highlights the need to provide for the needs of less advantaged (equity within generations) and for a fair treatment of future generations (intergenerational equity). Environment, since SD is based on an increased importance of the environment, whose quality contributes not only to achieve the “traditional” development’s objectives of real income increase (for example, through the growth of economic opportunities in the sectors of tourism, leisure, etc.), but also to reach the broader economic development goal of improving the quality of life, both directly (because the value of nature is greatly appreciated by individuals) and indirectly (poor environmental conditions, in fact, may cause diseases).

Despite the fact that the idea of “sustainability” is now widespread in the world, there is no single agreed-upon definition of it. SD can in fact be interpreted in several ways, as the numerous definitions given until now demonstrate (Clark and Munn, 1986; Goodland and Ledoc, 1987; Markandya and Pearce, 1988; Barbier (1989); Munasinghe and Lutz, 1991; Hossain, 1995; Islam et al., 2003).

Although some critics argue that sustainability is an empty term (see, for example, Kothari, 1990), virtually all definitions of SD share the principle of equity, emphasizing the tension between the goals of economic development and environmental protection (Cole, 1999; Jabareen, 2008).

In this framework, “sustainability” may be interpreted in a “strong” and a “weak” way (Pearce, 1993). Proponents of “strong sustainability” argue that natural capital cannot be substituted by man-made capital. In other words, to meet the needs of present and future generations, the amount of natural capital should be constant and the amount of man-made capital should be non-decreasing (Turner et al., 1994). On the opposite, “weak sustainability” requires that the sum of natural and man-made capital (the aggregate capital stock) is maintained constant (Pearce and Turner, 1991). Basically, the first interpretation asks for the full preservation of natural capital while, following the second approach, a fall in natural capital may be compensated by an increase in man-made capital.

Nevertheless, several considerations lead to prefer the “strong” interpretation of “sustainability” (Lanza, 1997; Siniscalco, 1993). First of all, the “weak” definition assumes the full substitutability between renewable and non-renewable resources ignoring the possibility that some natural resources may not have any substitute. Secondly, technical progress could increase the rate of substitutability between natural and man-made capital but without any certainty: risk aversion should suggest us to preserve natural resources. Finally, if an environmental asset is excessively exploited, the possible effect is the extinction of some natural species with its own irreversible consequences.

At this point of discussion, it should be clear that the concept of “sustainability” is strictly linked to a process of “dematerialization” of economic development, characterized by the need for a reduction in the scale of materials and energy employed in economic processes (Musu, 2000).

According to the proponents of “strong” sustainability, this process of “dematerialization” can be obtained only through a reduction in the scale of economic output (Daly and Cobb, 1989). On the opposite, proponents of “weak” sustainability believe that economic growth is perfectly compatible with the preservation of natural resources (Galeotti and Lanza, 1999).

Part of economic literature in fact argues for the existence of an inverted U-shaped relationship between the level of environmental degradation of a country and income per capita. In other words, as income grows, level of pollution should initially rise, reach a “turning point” and then decline in the following stages of economic growth. This relationship - known as the “Environmental Kuznets Curve” (EKC) - should suggest that policies accelerating economic growth should lead also to environmental improvements (Panayotou, 2000; Holtz-Eakin and Selden, 1995).

In this framework, the process of dematerialization of economic development will not take place in the first steps of development but only in the following stages when: 1) individuals will enjoy greater income

thus becoming more inclined to care for the environment they live and to demand for a better environmental quality (scale-effect); 2) technological changes promoted by economic growth will encourage a more efficient use of natural assets (technological effect); 3) the transition from an industrial to a service-based economy will improve the environmental conditions, being the service sector less energy and resource intensive (composition-effect) (see Bruvoll and Medin, 2003; Strand, 2002; Arrow et al., 1995)

Once more some considerations lead to prefer the “strong” interpretation of “sustainability”. The existence of the EKC in fact is based on a number of limitations due mainly to the type of pollutant analysed (Cole et al., 1997; Grossman and Krueger, 1993; Selden and Song, 1994; Shafik, 1994; Roberts and Grimes, 1997), the type of econometric model adopted (Kaufmann et al., 1998; Torras and Boyce, 1998), and the position of the estimated turning point in the development path (List and Gallet, 1999). This in fact can occur at extremely high levels of income, with the consequence that the potential environmental benefits becomes unreachable or that irreversible damages takes place before environmental degradation turns down.

Finally, a strong criticism comes from the consideration that the declining EKC side can be explained by the so called “pollution havens” hypothesis, i.e. the relocation of “dirty” industries from developed to developing areas (Cole, 2004). This implies that the EKC could be not available to today’s developing countries: since these will become tomorrow’s developed countries, the number of “pollution havens” will necessarily decrease with the consequence that today’s developing countries will face many difficulties to shift their pollution to another country (Nahma and Antrobus, 2005). Moreover, since developing countries face the first stages of economic growth, they generally employ great volumes of natural capital to increase their levels of production with the consequence that exploitation of environmental resources may easily become unsustainable (Stern et al, 1996; Dasgupta et al., as reported in Dinda, 2004). This should suggest the importance of environmental problems in developing economies.

### 3 The Role of MFIs in Developing Countries

In developing countries, above all in the rural areas, most of people have very little money since the majority of activities they carry out is generally not monetized. Nevertheless, in some circumstances of their life they face the need to get money (for example for expanding a business or buying land and equipment, but also for weddings, funerals, sickness, natural disasters, etc.). In such cases they do not have practical access to formal credit market, since one of the main fragility of developing economies is represented by credit market imperfections (Rutherford, 2000). Lack of access to credit is generally considered as one of the main reasons why most of people in developing countries remain poor (Hermes and Lensink, 2007).

Generally speaking, credit market imperfections occur when agents are unable to insurance themselves against idiosyncratic risks as they cannot transfer resources through time in a perfectly forecastable way. In developing countries, these imperfections happen mainly since existing credit markets restrict borrowing to individuals who have assets.

Much of existing literature highlights information problems that formal credit institutions meet in monitoring, screening and selecting borrowers in less-developed economies. In particular, most of theoretical works identify in lack of collateral and in financial intermediaries’ inability of discriminating among who performs well and who does not the main reasons for the failure of formal credit institutions (Besley, 1995). In other words, in developing economies, lenders do not know much about the type of borrowers and, as a result, they indistinctly apply higher interest rates to every borrower.

Following this line of reasoning, financial institutions may have success only when the following issues are taken in due consideration: i) a clear-cut identification of borrower’s type, ii) the assignment of few loans and iii) the creation of social ties among borrowers. Needless to say, the local involvement of financial intermediaries would be not easy to implement for formal credit institutions as this kind of participation would make economically inefficient their activity.

In the light of these considerations, a large body of theoretical literature (Morduch, 1999; Udry, 1994; Ahlin e Townsend, 2004) identifies in microfinance the best reply to asymmetric information problems in developing countries credit markets.

Microfinance is the provision of several financial services (mainly loans, but also deposits and insurance) to poor and low-income households and to their micro enterprises. These services may be provided both from individual money lenders and from formal/semiformal institutions (rural banks, cooperatives, nongovernmental organizations, etc.). In particular, MFIs are specialized in making uncollateralized loans in developing areas following the so-called “group lending” method. Basically, borrowers form a group where they are jointly liable for loans assigned to each of them. In other words, if a member of a group is unable to refund the loan, all group’s members are not eligible for a new loan. In this sense, the evaluation of borrowers’ group in terms of inclusion or exclusion of people in the group is determined not on the basis of collaterals but on the basis of a cognitive process. More precisely, a loan is granted to a group that shares similar interests in accessing to financial services. These groups may be self-formed without any interference from the bank (as in the case of Grameen Bank in Bangladesh, BancoSol in Bolivia, Bank Rakyat in Indonesia) or be composed by an entire village population (as in the case of FINCA, Pro Mujer and Freedom from Hunger). After group’s formation, generally borrowers receive training from MFIs’ employees through periodic meetings.

Joint liabilities lending group go over the lack of loan collateral since MFIs can obtain information regarding reputation, indebtedness and wealth of the loan applicant and about his/her efforts to ensure repayment of the loan thanks to a continuously learning and interacting knowledge process (Cull et al., 2007). Basically, what takes place in these groups is some kind of peer monitoring which reduces or erases the agency costs for the lender. This monitoring activity results to be particularly effective since group members generally live close to each other.

It is worth noting that most of people who receive a loan are women. This can be explained with the fact that women are more reliable debtors since they follow more conservative investment strategies given their stronger social and family ties: this decreases the credit risk and, as a consequence, the cost of monitoring for MFIs.

In this framework, several studies (see for example Ghatak and Guinnane, 1999) formalise the rationale for the joint liabilities lending group formation, arguing that the main success for microfinance with respect to formal credit institutions in developing countries depends upon a group lending’s ability to 1) identify the degree of borrower’s riskness (adverse selection), 2) verify that the borrower utilises the loan properly and that once made he will be able to repay (moral hazard) and 3) find methods to force the borrower to repay the loan if he is reluctant to do so (enforcement).

MFIs are nowadays widespread in less developed economies. The number of people who received a loan from MFIs grew from 13.5 million in 1997 to 113.3 million in 2005, 84% of them being women (Daley-Harris, 2006). The estimated total loan volume is today of USD 25 billions. Since 2004 international public and private-sector investors in microfinance have more than doubled their investments to USD 4.4 billions in 2006, and by 2015 they are expected to rise to around USD 20 billions (Deutsche Bank Research, 2007). Finally, the estimated total loan volume is today of USD 25 billions. These statistics makes microfinance a significant tool to contribute to the achievement of the UN Millennium Development Goals (MDGs) of reducing by half the amount of people living below the poverty line by 2015.

#### **4 Microfinance and Environmental Sustainability**

Taking into account the role of MFIs in less developed countries, this section moves on analysing briefly the environmental effects of production activities started up with loans issued by these institutions. Most of existing literature on MFIs does not take into account problems related to environmental sustainability. Nevertheless, the EKC suggests that dynamics between economic growth and the environment follow the trend of an inverted U-curve. Putting in other words, the environmental characteristics of the system

in which agents operate start to modify not when production activity exceeds a critical value, but when it starts. Moreover, MDGs - which microfinance should contribute to - include also the aim of integrating the principles of SD into country policies and programs, and of reversing the loss of environmental resources. For these reasons, the relationship between microfinance and the environment appears to be a very topical problem.

It can be argued that the environmental impact of enterprises started up with loans issued through microfinance can be ignored given the small size of these businesses. But pollution is not a prerogative of large firms only. Some studies show that small firms may pollute more than large ones, for example because of technical inefficiencies in their production process (Kent, 1991). Moreover, poor people in developing countries are strongly affected by environmental damages, considering that the main source of their income is represented mainly by natural resources.

Several studies (Anderson et al., 2002; Reardon and Vosti, 1995) focus on the unmeasured use of pesticide and fertilizers as the main reason for pollution in developing countries. For example, rural people receiving a loan from MFIs can intensify their agricultural processes. This frequently implies a massive use of pesticides and fertilizers with a consequent increase in soil and water pollution.

Loans are often employed to finance massive purchases of cattle that may result in land degradation and environmental damages. Grazing animals in fact destroy plants, compact soil and damage habitat of wildlife.

Environmental problems arise when additional income from microfinance is employed to buy new lands. This may increase deforestation with all its own (negative) environmental consequences.

Finally, loans may be used to create new farms. In this case, small firms' decision on where to locate their activity can affect negatively environment since most of times the choice about businesses location is taken not in compliance of environmental-sustainable rules but on the ground of the environmental structure that allows firms to achieve a better economic performance.

In this framework, it is worth stressing once more that developing countries face the first stages of economic growth when people generally do not care much about the environment. The low attention to environmental issues joined to the complete lack of environmental regulation makes pollution free to rise without any control.

## 5 How to Make Microfinance Environmental-Friendly?

In this section we try to give some suggestions in order to make microfinance more environmental-friendly. Starting point of our discussion is the consideration that MFIs are generally not aware about the environmental impacts caused by their loans and how to mitigate them (Lal and Israel, 2006). However, in recent years, several researchers started to look at the potentialities implicit in the development of MFIs in respect to "green" problems.

As a first step towards environmental sustainability we argue that MFIs should pay a larger attention on environmental matters. Our hypothesis is supported by some studies on environment and development (see, for example, the conceptual work of Pallen, 1997) that show how the involvement of MFIs at local level may play a crucial role in the implementation of investment policies more environmental-friendly. This means that MFIs should require environmental due diligence on loans they provide, building environmental liability into their loan contract terms and monitoring risks after the loan is made. As a consequence environmental due diligence could represent the only collateral that a group has to provide to obtain a loan.

The second step towards environmental sustainability is a direct consequence of the first one. It consists in environmental risk quantification when MFIs provide credit. For example, environmental-friendly activities could have priority in obtaining credit. Loan applications could be employed to ask the potential borrower to describe the possible environmental effects of the activity he will undertake through the loan. In this process, MFIs could employ a set of rules as "benchmark" to quantify environmental risk. It is worth noting that some progresses have been done in this direction. For example, some MFIs already utilise the

so called “Environmental Impact Assessment” (EIA) to evaluate an entrepreneurial activity in relation to environmental problems. EIA consists in appraising the environmental impact of a project, identifying mitigation measures and alternatives.

Finally, we argue that a third step towards environmental sustainability is represented by the involvement of local population. The link between environmental characteristics of a country and social and cultural characteristics of its inhabitants is in fact a crucial point. A great deal of environmental damage depends on how population evaluates environmental issues, that is, in economic terms, whether people can internalise the distortions they cause. In this framework, we cannot ignore the role played by knowledge process that, operating among individuals, solve problems related to the enforcement of loan’s contracts and related to insolvent behaviour of borrowers, while, operating among individuals and environment, contributes to the formation of a great awareness for environmental problems.

We believe that environment protection can be achieved whether local debtors are aware of the distortions that entrepreneurial activity may cause. In other words, a process of knowledge and learning the characteristics of the territory should operate, leading local debtors to coordinate in achieving targets eco-compatible. As argued by Lal and Israel (2006), the diffusion of environmental awareness across domestic people may have a great social effect since a community may influence other sectors of the economy.

In promoting environmental awareness, MFIs play a crucial role. These institutions may employ several measures to reach this aim.

First of all, MFIs could implement policies oriented to training and formation, technological know-how and entrepreneurial development in respect to the environment. In this framework, training programmes generally provided to borrowers represent an important tool to spread environmental awareness. They could be enlarged to include formation on ecology and environmental management.

Secondly, MFIs could involve community members in the realisation of a project, taking advantage of the fact that some members could know better than others the possible environmental damages that the project could cause. For example, in a study on microcredit, social capital and common pool resources, Anderson et al., (2002) argue that the environmental consequences of increased income for women may be more pronounced than for men. The reason is that in developing countries women have a strong relationship with the environment since they usually look after water collection, fuelwood gather etc. As a consequence women are generally induced to keep the environment they live in good conservative conditions since they may suffer the most from environmental damages. For this reason, authors conclude that MFIs should involve women in order to give them the opportunity to share with other community members their own knowledge about environmental problems.

Basically, some community members involved in loans are expected to be able to provide important contributions for environmental issues based on their own experiences. MFIs may employ this knowledge to stimulate peer learning process among the other members of the group.

Summarizing, MFIs can positively affect many countries’ environmental aspects on condition that they implement policies able to make compatible the loans they lend with the environment and that they encourage the diffusion of environmental awareness across borrowers.

## 6 Conclusions

In this article we highlight the importance of MFIs for people in developing countries and the influence that it may exert on SD, in particular on its environmental dimension.

Several considerations suggest that only a “strong” interpretation of SD should be accepted with the consequence that the amount of natural capital should be preserved and kept constant to meet the needs of future generations.

In particular, the problem of sustainability may be crucial in developing countries which, facing the first stages of economic growth, use generally great volumes of natural resources to increase their levels of production. In these countries many economic activities are today implemented thanks to microfinance

loans. Microfinance in fact offers better performance in terms of repayment of the loan compared with institutional credit system. This result is achieved mainly since debtors are jointly responsible for the loan granted to each of them.

In this framework, the relationship between MFI and environmental dimension of SD appears to be a very topical problem. Although production activities started up with loans issued by MFIs are usually small, this does not exclude that they may determine several environmental damages. People in developing countries receiving a loan generally afford changes which often result in environment depletion. Moreover, the low attention to environmental issues joined to the complete lack of environmental regulation makes pollution free to rise without any control.

We suggest that MFIs can positively affect environmental problems on condition that these institutions develop policies aiming to make compatible the loans they provide with the environment and that they encourage the diffusion of environmental awareness across borrowers.

Because of the lack of data our work is mainly theoretical. For this reason, we believe that further studies, both theoretical and empirical, should analyse more closely and accurately the role played by these new forms of financial aid in developing countries with particular regards to environmental matters.

## References

- Ahlin, C. & Townsend, R. (2004). 'Using Repayment Data to Test Across Models of Joint Liability Lending', *Working paper* June 2004.
- Anderson, C.L., Locker, L. & Nugent, R. (2002). 'Microcredit, Social Capital, and Common Pool Resources', *World Development* Vol. 30, No. 1, pp. 95-105.
- Arrow, K.J., Bolin, B., Costanza, R., Dasgupta, P., Folke, C., Holling, C.S., Jansson, B.-O., Levin, S., Maler, K.-G., Perrings, C. & Pimentel, D. (1995). 'Economic Growth; Carrying Capacity, and the Environment', *Science* Vol. 268, pp. 520-521.
- Barbier, E. (1989). 'Economics, Natural Resource Scarcity and Development', London: *Earthscan Publications Ltd.*
- Besley, T. (1995). 'Savings, credit, and insurance', In: J. Behrman & T.N. Sarinivasan, eds., *Handbook of Development Economics*, Vol. 3A, pp. 2123-207, Amsterdam, North-Holland.
- Bruvoll, A. & Medin, H. (2003). 'Factors Behind the Environmental Kuznets Curve - A Decomposition of the Changes in Air Pollution', *Environmental and Resource Economics* Vol. 24, pp. 27-48.
- Clark, W. & Munn, R. (1986). 'Sustainable Development of the Biosphere', Cambridge: *Cambridge University Press.*
- Cole, M.A., Rayner, A.J. & Bates, J.M. (1997). 'The Environmental Kuznets Curve: an Empirical Analysis', *Environment and Development Economics* Vol. 2, No. 4, pp. 401-416.
- Cole, M.A. (1999). 'Limits to Growth, Sustainable Development and Environmental Kuznets Curve: an Examination of the Environmental Impact of Economic Development', *Sustainable Development* Vol. 7, pp. 87-97.
- Cole, M.A. (2004). 'Trade, the pollution-haven hypothesis and the environmental Kuznets curve: examining the linkages', *Ecological Economics* Vol. 48, No. 1, pp. 71-81.
- Cull, R., Demirgüç-Kunt, A. & Morduch, J. (2007). 'Financial performance and outreach: a global analysis of leading microbanks', *Economic Journal, Royal Economic Society* Vol. 117, No. 517, pp. F107-F133, 02.
- Daley-Harris, S. (2006). 'State of the microcredit summit campaign report 2006', *Washington, DC: Microcredit summit campaign.*
- Daly, H.E. & Cobb, J.B. (1989). 'For the Common Good: Redirecting the Economy Towards Community, the Environment and a Sustainable Future', *Green Print.*
- Deutsche Bank Research (2007). 'Microfinance: an emerging investment opportunity. Uniting social investment and financial returns', *Deutsche Bank AG, DB Research*, D-60262 Frankfurt am Main, Germany.
- Dinda, S. (2004). 'Environmental Kuznets Curve Hypothesis: A Survey', *Ecological Economics* Vol. 49, pp. 431-455.
- Galeotti, M. & Lanza, A. (1999). 'Desperately Seeking (Environmental) Kuznets', *Fondazione Eni Enrico Mattei Working Paper* No. 2.99.
- Gatak, M. & Guinnane, T.W. (1999). 'The Economics of Lending with Joint Liability: Theory and Evidence', *Journal of Development Economics* Vol. 60, pp. 195-228.

- Goodland, R. & Ledoc, G. (1987). 'Neoclassical Economics and Principles of Sustainable Development', *Ecological Modelling* Vol. 38.
- Grossman, G.M. & Krueger, A.B. (1993). 'Environmental Impacts of a North American Free Trade Agreement', In: P. Garber, ed., *The U.S.-Mexico Free Trade Agreement*. Cambridge, MA: MIT Press.
- Hermes, N. & Lensink, R. (2007). 'The Empirics of Microfinance: What do we Know?' *The Economic Journal* Vol. 117, pp. F1-F10.
- Holtz-Eakin, D. & Selden, T.M. (1995). 'Stocking the fires? CO2 emissions and economic growth', *Journal of Public Economics* Vol. 57, pp. 85-101.
- Hossain, K. (1995). 'Evolving Principles of Sustainable Development and Good Governance', In: K. Ginther, E. Denters and Paul J.I.M. de Waart, eds "*Sustainable Development and Good Governance*", Norwell, Ma.: Kluwer Academic Publishers.
- Islam, S.M.N., Munasinghe, M. & Clarke, M. (2003). 'Making long-term economic growth more sustainable: evaluating the costs and benefits', *Ecological Economics* Vol. 47, pp. 149-166.
- Jabareen, Y. (2008). 'A new conceptual framework for sustainable development', *Environment, Development and Sustainability* Vol. 10, No. 2, pp. 179-192.
- Kaufmann, R., Davidsdottir, B., Garnham, S. & Pauly, P. (1998). 'The determinants of atmospheric SO2 concentrations: reconsidering the environmental Kuznets curve', *Ecol. Economics* Vol. 25, pp. 209-220.
- Kent, L. (1991). 'The Relationship Between Small Enterprise and Environmental Degradation in the Developing World With Emphasis on Asia', Prepared for the Office of Small, Micro and Informal Enterprises, *USAID. Sept. Bethesda, Maryland, USA: Development Alternatives Incorporated*.
- Kothari, R. (1990). 'Environment, technology and ethics', In: J. R. Engel & J. G. Engel (Eds.), *Ethics of Environment and Development - Global Challenge, International Response*. Tucson: *University of Arizona Press*. pp. 27-49.
- Lal, A. & Israel, E. (2006). 'An overview of microfinance and the environmental sustainability of smallholder agriculture', *Int. J. Agricultural Resources Governance and Ecology* Vol. 5, No. 4, pp. 356-376.
- Lanza, A. (1997). 'Lo Sviluppo Sostenibile', *Il Mulino*, Bologna.
- List, J.A. & Gallet, C.A. (1999). 'The environmental Kuznets curve: does one size fit all?', *Ecological Economics* Vol. 31, pp. 409-423.
- Markandya, A. & Pearce, D. (1988). 'Natural Environments and the Social Rate of Discount', *Project Appraisal* Vol. 3, No. 1.
- Morduch, J. (1999). 'The Microfinance Promise', *Journal of Economic Literature* Vol. XXXVII, pp. 1569-1614.
- Munasinghe M. & Lutz, E. (1991). 'Environmental-Economic Evaluation of Projects and Policies for Sustainable Development', World Bank, Environment Department, *Environment Working Paper* No. 42.
- Musu, I. (2000). 'Introduzione all'economia dell'ambiente', *Il Mulino*, Bologna.
- Nahman, A. & Antrobus, G. (2005). 'The Environmental Kuznets Curve: a Literature Survey', *South African Journal of Economics* Vol. 73, No. 1.
- Pallen, D. (1997). 'Environmental Sourcebook for Micro-Finance Institutions', Asian Branch, *Canadian International Development Agency*.
- Panayotou, T. (2000). 'Economic Growth and the Environment', *CID Working Paper* No. 56, July 2000.
- Pearce D.W. & Turner, R.K. (1991). 'Economia delle risorse naturali e dell'ambiente', *Il Mulino*.
- Pearce, D.W., Markandya, A. & Barbier, E. (1991). 'Progetto per una economia verde', *Il Mulino*, Bologna.
- Pearce, D.W. (1993). 'Blueprint Three: Measuring Sustainable Development', *Earthscan, London*.
- Reardon, T. & Vosti, S.A. (1995). 'Links between Rural Poverty and the Environment in Developing Countries: Asset categories and Investment Poverty', *World development* Vol. 23, No. 9, pp. 1495-1506.
- Roberts, J. & Grimes, P. (1997). 'Carbon intensity and economic development 1962-91: a brief exploration of the environmental Kuznets curve', *World Dev.* Vol. 25, pp. 191-198.
- Rutherford, S. (2000). 'The Poor and Their Money', *Oxford University Press*, New Delhi.
- Selden, T.M. & Song, D. (1994). 'Environmental Quality and Development: Is There a Kuznets Curve for Air Pollution Emissions?', *Journal of Environmental Economics and Management* Vol. XXVII, pp. 147-162.
- Shafik, N. (1994). 'Economic development and environmental quality: an econometric analysis', *Oxf. Economic Papers* Vol. 46, pp. 757-773.



- Siniscalco, D. (1993). 'L'ambiente Globale tra Interdipendenza e Incertezza', In: Musu (a cura di), *Economia e ambiente*, Bologna, *Il Mulino*.
- Stern, D., Common, M.S. & Barbier, E.B. (1996). 'Economic Growth and Environmental Degradation: The Environmental Kuznets Curve and Sustainable Development', *World Development* Vol. 24, No. 7, pp. 1151-1160.
- Strand, J. (2002). 'Environmental Kuznets curves: Empirical relationships between environmental quality and economic development', Memorandum 04, *Oslo University, Department of Economics*.
- Tiezzi, E. (1993), 'Verso uno Sviluppo Sostenibile', In: Musu (a cura di), *Economia e ambiente*, Bologna, *Il Mulino*.
- Torras, M. & Boyce, J. (1998). 'Income, inequality, and pollution: a reassessment of the environmental Kuznets curve', *Ecol. Economics* Vol. 25, pp. 147-160.
- Turner, R. K., Pearce, D. & Bateman, I. (1994). 'Environmental economics: An elementary introduction', *Prentice Hall: Harvester Wheatsheaf*.
- Udry, C. (1994). 'Risk and Insurance in a Rural Credit Market: An Empirical Investigation in Northern Nigeria', *Review of Economic Studies* Vol. 61, pp. 495-526.
- UNDP (1991). 'Human Development Report', New York: *Oxford University Press*.
- World Commission on Environment and development (WCED) (1987). 'Our Common Future', *Oxford University Press*, New York.