



Social Capital and the Environment

JULES PRETTY and HUGH WARD *

University of Essex, Colchester, UK

Summary. — For as long as people have managed natural resources, they have engaged in collective action. But development assistance has paid too little attention to how social and human capital affects environmental outcomes. Social capital comprises relations of trust, reciprocity, common rules, norms and sanctions, and connectedness in institutions. Recent years have seen remarkable advances in group formation, with in the past decade some 408,000–478,000 groups emerging with 8.2–14.3 million members in watershed, irrigation, microfinance, forest, and integrated pest management, and for farmers’ research. A new typology describes the evolution of groups through three stages, and indicates what kinds of policy support are needed to safeguard and spread achievements. © 2001 Elsevier Science Ltd. All rights reserved.

Key words — social capital, participatory organizations, natural resource management

1. COLLECTIVE ACTION AND THE ENVIRONMENT

For as long as people have managed natural resources, they have engaged in forms of collective action. Farming households have collaborated on water management, labor sharing and marketing; pastoralists have co-managed grasslands; fishing families and their communities have jointly managed aquatic resources. Such collaboration has been institutionalized in many forms of local association, through clan or kin groups, traditional leadership, water users’ groups, grazing societies, women’s self-help groups, youth clubs, farmer experimentation groups, church groups, and labor-exchange societies.

Although constructive resource management rules and norms have been embedded in many cultures and societies, from collective water management of Egypt, Mesopotamia and Indonesia to herders of the Andes and dryland Africa; from water harvesting in Roman north Africa and southwest North America to shifting agriculture systems, it has been rare for the importance of such local groups and institutions to be recognized in recent agricultural and rural development. In both developing and industrialized country contexts, policy and practice has tended to be preoccupied with changing the behavior of individuals rather than of groups or communities. As a result, agriculture has had an increasingly destructive effect on the environment (Huxley, 1960;

Palmer, 1976; Jodha, 1990; Netting, Stone, & Stone, 1990; Ostrom, 1990; Pretty, 1995a, 1998; Kothari, Pathak, Anuradha, & Taneja, 1998).

In this paper, first, we link social and human capital formation in rural communities with improvement in natural capital, reviewing the relevant theoretical literature and bringing together previously scattered evidence from case studies. We show how social and human capital, embedded in participatory groups within rural communities has been central to equitable and sustainable solutions to local development problems. Going beyond the existing literature, we develop a typology of such groups by their degree of maturity, defined in terms of their potential for self-defining and self-sustaining activity. We argue that whether groups progress toward maturity is likely to be related to the availability of social capital locally, but also to appropriate inputs from government and voluntary agencies.

In some contexts, the loss of local institutions has provoked natural resource degradation. In India, the loss of management systems for common property resources has been a critical

* We are very grateful to Bruce Frank, Diana Carney, Arjan de Haan, David Lawrence, Andy Norton, Jethro Petit, and Norman Uphoff, together with two anonymous referees, for their comments on related material and/or earlier drafts of this paper, and their insights on the issues contained. Final revision accepted: 8 July 2000.

factor in the increased overexploitation, poor upkeep, and physical degradation observed over the past half century. Jodha's (1990) now classic study of 82 villages in seven states found that only 10% of villages still regulated grazing or provided watchmen compared with the 1950s; none levied grazing taxes or had penalties for violation of local regulations; and only 16% still obliged users to maintain and repair common resources.

Elsewhere in India, private ownership or operation of surface and ground water use for irrigation has generally replaced collective systems (Pretty, 1995a; Singh & Ballabh, 1997; Kothari *et al.*, 1998). Again, the result is substantial degradation of natural resources—a classic example of an *n*-person prisoner's dilemma (Ostrom, 1990). The future for natural resources and for the many rural households that rely on them is bleak in the absence of these disappearing institutional structures.

At the same time as local institutions have disappeared, so the state has increasingly taken responsibility for natural resource management, largely because of a mistaken assumption that these resources are mismanaged by local people (Ostrom, 1990; Scoones, 1994; Pretty & Pimbert, 1995; Leach & Mearns, 1996; Pretty & Shah, 1997; Ghimire & Pimbert, 1997). But a variety of studies of rural development have shown that when people are well organized in groups, and their knowledge is sought, incorporated and built upon during planning and implementation, then they are more likely to sustain activities after project completion (de los Reyes & Jopillo, 1986; Cernea, 1987, 1991; Pretty, 1991; Uphoff, 1992; Pretty, Thompson, & Kiara, 1995; Bunch & López, 1996; Röling & Wagemakers, 1997; Singh & Ballabh, 1997; Uphoff, Esman, & Krishna, 1998; Pretty, 1995a, 1998).

One study of 25 completed World Bank agricultural projects found that continued success was associated clearly with local institution building (Cernea, 1987). Twelve of the projects achieved long-term sustainability, and it was in these that local institutions were strong. In the others, the rates of return had all declined markedly, contrary to expectations at the time of project completion. Outcomes were unsustainable where there had been no attention to institutional development and local participation.¹

Many nonsustainable systems have emerged because of the public good aspects of the environment. Unlike conventional capital,

natural capital (nature's goods and services—cf. Costanza *et al.*, 1997) tends to be at least partially a public good—more correctly, they are complex mixtures of public, club and private goods² and so rarely have a market value. Public goods are goods or services which when consumed by a group member cannot be withheld from other members of the group, or when consumed still can be consumed by other members of the group (Taylor, 1982; Ostrom, 1990, 1996).

Like all public goods, it is difficult to say who is at fault when natural capital declines. Without rules, individuals tend to overuse and underinvest in it: they are tempted to take the benefit without contributing anything themselves—in effect, to free-ride (Hardin, 1968). When such public goods and services are considered free and so valued at zero, the market signals that they are only valuable when converted into something else.³ So the profit from converting a forest into timber is counted on the nation's balance sheet, but all the lost services (wild foods, fodder grasses, climate regulation, biodiversity) tend not to be subtracted. Social institutions based on trust and reciprocity, and agreed norms and rules for behavior, can mediate this kind of unfettered private action.

It is clear that new thinking and practice are needed, particularly to develop forms of social organization that are structurally suited for natural resource management and protection at local level. This usually means more than just reviving old institutions and traditions. More commonly, it means new forms of organization, association and platforms for common action. The past decade has seen a growing recognition of the effectiveness of such local groups and associations for sustainable environmental and economic outcomes.

2. SOCIAL CAPITAL

There has been a rapid growth in interest in the term "social capital" in recent years (Bourdieu, 1986; Coleman, 1988, 1990; Putnam, 1993, 1995; Carney, 1998; Flora, 1998; Grootaert, 1998; Ostrom, 1998; Pretty, 1998; Scoones, 1998; Uphoff, 1998). The term captures the idea that social bonds and social norms are an important part of the basis for sustainable livelihoods. Its value was identified by Jacobs (1961) and Bourdieu (1986), later given a clear theoretical framework by Cole-

man (1988, 1990), and brought to wide attention by Putnam (1993, 1995). Coleman describes it as “the structure of relations between actors and among actors” that encourages productive activities. These aspects of social structure and organization act as resources for individuals to use to realize their personal interests.⁴ Local institutions are effective because “they permit us to carry on our daily lives with a minimum of repetition and costly negotiation” (Bromley, 1993).

As it lowers the costs of working together, social capital facilitates co-operation. People have the confidence to invest in collective activities, knowing that others will also do so. They are also less likely to engage in unfettered private actions that result in negative impacts, such as resource degradation. Although there are already many different descriptions of social capital,⁵ we identify four central aspects: relations of trust; reciprocity and exchanges; common rules, norms and sanctions; connectedness, networks and groups.

(a) *Relations of trust*

Trust lubricates co-operation. It reduces the transaction costs between people, and so liberates resources. Instead of having to invest in monitoring others, individuals are able to trust them to act as expected. This saves money and time. It can also create a social obligation—trusting someone engenders reciprocal trust. There are two types of trust: the trust we have in individuals whom we know; and the trust we have in those we do not know, but which arises because of our confidence in a known social structure. Trust takes time to build, but is easily broken (Gambetta, 1988; Fukuyama, 1995), and when a society is pervaded by distrust, cooperative arrangements are unlikely to emerge (Baland & Platteau, 1998).⁶

(b) *Reciprocity and exchanges*

Reciprocity and exchanges also increase trust. There are two types of reciprocity (Coleman, 1990; Putnam, 1993). Specific reciprocity refers to simultaneous exchanges of items of roughly equal value; and diffuse reciprocity refers to a continuing relationship of exchange that at any given time may be unrequited, but over time is repaid and balanced. Again, this contributes to the development of long-term obligations between people, which

can be an important part of achieving positive environmental outcomes (Platteau, 1997).⁷

(c) *Common rules, norms and sanctions*

Common rules, norms and sanctions are the mutually agreed or handed-down norms of behavior that place group interests above those of individuals. They give individuals the confidence to invest in collective or group activities, knowing that others will do so too. Individuals can take responsibility and ensure their rights are not infringed. Mutually-agreed sanctions ensure that those who break the rules know they will be punished.

These are sometimes called the rules of the game (Taylor, 1982), or the internal morality of a social system (Coleman, 1990), the cement of society (Elster, 1989), or the basic values that shape beliefs (Collins & Chippendale, 1991). They reflect the degree to which individuals agree to mediate or control their own behavior. Formal rules are those set out by authorities, such as laws and regulations, while informal ones are those individuals use to shape their own everyday behavior. Norms are, by contrast, preferences and indicate how individuals should act; rules are stipulations of behavior with positive and/or negative sanctions. A high social capital implies high “internal morality,” with individuals balancing individual rights with collective responsibilities (Etzioni, 1995).

(d) *Connectedness, networks and groups*

Connectedness, networks, and groups and the nature of relationships are a vital aspect of social capital. There may be many different types of connection between groups (trading of goods, exchange of information, mutual help, provision of loans, common celebrations (prayer, marriages, funerals)). They may be one-way or two-way, and may be long-established (and so not responsive to current conditions), or subject to regular update.

Connectedness manifests itself in different types of groups at the local level—from guilds and mutual aid societies, to sports clubs and credit groups, to forest, fishery or pest management groups, and to literary societies and mother and toddler groups. It also implies connections to other groups in society, from both micro to macro levels (Uphoff, 1993; Grootaert, 1998; Woolcock, 1998; Rowley,

1999).⁸ Connectedness, therefore, has five elements:

- (i) Local connections—strong connections between individuals and within local groups and communities.
- (ii) Local–local connections—horizontal connections between groups within communities or between communities, which sometimes become platforms and new higher-level institutional structures.
- (iii) Local–external connections—vertical connections between local groups and external agencies or organizations, being one-way (usually top–down) or two-way.
- (iv) External–external connections—horizontal connections between external agencies, leading to integrated approaches for collaborative partnerships.
- (v) External connections—strong connections between individuals within external agencies.

Even though some agencies may recognize the value of social capital, it is common to find not all of these connections being emphasized. For example, a government may stress the importance of integrated approaches between different sectors and/or disciplines, but fail to encourage two-way vertical connections with local groups. A development agency may emphasize formation of local associations without building their linkages upward with other external agencies that could threaten the successes.

In general, the more linkages the better; two-way relationships are better than one-way; and linkages subject to regular update are generally better than historically-embedded ones. Rowley's (1999) study of social capital in sub-Saharan Africa found a loose relationship between connectedness and wealth, but causality was unclear: "did well connected people become rich or rich people able to afford to be well-connected." There may be cases, however, where a group might benefit from isolation, because it can avoid costly external demands.

3. SOCIAL AND HUMAN CAPITAL AS PREREQUISITES FOR NATURAL CAPITAL IMPROVEMENTS

To what extent, then, are social and human capital prerequisites for long-term improvements in natural capital? Natural capital can clearly be improved in the short-term with no

explicit attention to social and human capital. Regulations and economic incentives are commonly used to encourage change in behavior, and include establishment of strictly protected areas, regulations for erosion control or adoption of conservation farming, economic incentives for habitat protection, and pesticide taxes (Pretty *et al.*, 2000). But there is considerable evidence to show that though these may change behavior, there may be little or no positive effect on attitudes. Farmers commonly revert to old practices when the incentives end or regulations are no longer enforced.⁹

The social and human capital necessary for sustainable and equitable solutions to natural resource management comprise a mix of existing endowments and that which is externally-facilitated. External agencies or individuals can act on or work with individuals to increase their knowledge and skills, their leadership capacity, and their motivations to act. They can act on or work with communities to create the conditions for the emergence of new local associations with appropriate rules and norms for resource management. If these then lead to the desired natural capital improvements, then this again has a positive feedback on both social and human capital.

Although there is now emerging consensus that social capital and human capital manifested in groups does pay (Narayan & Pritchett, 1996; Rowley, 1999), there are surprisingly few studies that have been able to compare group with individual approaches in the same context (most have observed changes over time, with changing performance of groups being compared with earlier performance of individual approaches).¹⁰

For farmers to invest in these approaches, they must be convinced that the benefits derived from group or joint or collective approaches will be greater than those from individual ones. External agencies, by contrast, must be convinced that the required investment of resources to help develop social and human capital, through participatory approaches or adult education, will produce sufficient benefits to exceed the costs (Grootaert, 1998; Dasgupta & Serageldin, 2000).¹¹

Ostrom (1998) puts it this way: "participating in solving collective-action problems is a costly and time consuming process. Enhancing the capabilities of local, public entrepreneurs is an investment activity that needs to be carried out over a long-term period." For initiatives to persist, the benefits must then exceed both these

Table 1. *Some benefits of social capital manifested in groups*^a

Country	Impacts
Kenya	Government group-based soil conservation program has run contemporaneously alongside nongroup based farmers, with farmers organized into soil conservation committees outperforming those working alone on a range of criteria—maize yields are 50–100% greater, fodder availability was greater, there were more trees and greater diversity of crops grown; groundwater recharge had led to reappearance of springs; and real wage labor rates had doubled.
Philippines	Government's national irrigation program organized farmers into groups and compared performance with those farming alone—farmers in irrigation groups get 19% more rice yield; contribute more to system costs and maintenance, and are more likely to see their suggestions incorporated into irrigation design.
Nepal	The Small Farmer Development Project worked with group formation, and compared outcomes with control communities (with no groups); farmers in groups achieved 10–15% higher cereal yields, 70% higher milk yields, 40% higher income, and communities as a whole had higher adult literacy rates, more children at school, greater adoption of family planning, and greater numbers of people vaccinated.
Denmark	Farmers in the 620 crop protection groups show greater reductions in pesticide use (both doses and frequency of applications) and in costs than those working alone.
United States	Members of the Practical Farmers of Iowa perform better than nonmembers in the same region; but those organized into groups within PFI outperform individual members even more: yields are roughly the same, but group members use 52% less nitrogen and 65% less pesticide.
Australia	45 rice check groups of some 15–30 members each have been organized since 1986 in New South Wales, with members consistently outperforming regional rice yields by 24% (8.4 t/ha).

^a Sources: Just (1998); PFI, 1995; Harp, Boddy, Shequist, Huber, & Exner (1996); Lacy (1997); MOA/MALDLM (1988–99); Pretty (1995a); Pretty (1995b); Admassie, Mwarasomba, & Mbogo (1998); Bagadion & Kortzen (1991); Rahman (1984).

costs and those imposed by any free-riders in the group-based or collective systems (Table 1).

Clearly, not all forms of social capital are good for everyone. A society may be well organized, have strong institutions, have embedded reciprocal mechanisms, but be based not on trust but on fear and power, such as feudal, hierarchical, racist and unjust societies (Knight, 1992). Formal rules and norms can also trap people within harmful social arrangements. Again a system may appear to have high social capital, with strong families and religious groups, but contain some individuals with severely depleted human capital through abuse or conditions of slavery or other exploitation. Some associations can also act as obstacles to the emergence of sustainable livelihoods. They may encourage conformity, perpetuate adversity and inequity, and allow certain individuals to get others to act in ways that suit only themselves (Olson, 1965; Taylor, 1982).

Some types of social capital are known to be on the decline, such as bowling leagues, church

attendance and voting patterns in the USA (Putnam, 1995), but these are being replaced by new forms of social capital, such as community-based organizations, cross-denominational churches and new public-private partnerships (Sirianni & Friedland, 1997). Thus the total social capital may not be the key indicator—membership in the national Federation of Women's Clubs in the United States is down by a half since the 1960s, but newer women's groups have addressed issues such as domestic violence that were previously not dealt with in old forms of social capital (CPN, 1999).

It is important, therefore, to distinguish between social capital embodied in such groups as sports clubs, denominational churches, parent-school associations and even bowling leagues, and that in resource-oriented groups concerned with watershed management, micro-finance, irrigation management, pest management, and farmer-research. It is also important to distinguish social capital in contexts with a large number of institutions (high density) but little cross-membership and high excludability,

with that in contexts with fewer institutions but multiple, overlapping membership of many individuals.

The CPN (1999) focus on the types of social capital that “enhance capacities to solve public problems and empower communities” rather than just quantitative increases or decreases in social capital. This is an important distinction for the challenges of sustainable development. In the face of growing uncertainty (e.g., economies, climates, political processes), the capacity of people both to innovate and to adapt technologies and practices to suit new conditions becomes vital. Some believe uncertainty is growing—if it is, then there is greater need for innovation. An important question is whether forms of social capital can be accumulated to enhance such innovation (Boyte, 1995; Hamilton, 1995).

Another issue is the notion of path-dependence (a term used by Putnam to imply a degree of historical determinism). It is now appreciated that social capital can increase with use. Under certain circumstances, the more it is used, the more it regenerates. Social capital is self-reinforcing when reciprocity increases connectedness between people, leading to greater trust, confidence and capacity to innovate. So, can social capital be created where it has been missing, and can it lead to positive environmental outcomes?

4. EMPIRICAL EVIDENCE ON LOCAL GROUPS FOR NATURAL RESOURCE IMPROVEMENT

Recent years have seen an extraordinary expansion in collective management programs throughout the world, described variously by such terms as community management, participatory management, joint management, decentralized management, indigenous management, user-participation, and co-management.

These advances in social capital creation have been centred on participatory and deliberative learning processes leading to local group formation in six sectors: watershed/catchment management; irrigation management; micro-finance delivery; forest management; integrated pest management; and farmers’ research groups.¹² In the past decade, we estimate that 408,000–478,000 new groups have arisen in these sectors—mostly in developing countries (Table 2). Most have evolved to

be of similar small rather than large size (as predicted by Olson, 1982), typically with 20–30 active members (40 for microfinance). This puts the total involvement at some 8.2–14.3 million people. Most groups show the collective effort and inclusive characteristics that Flora and Flora, 1993 identify as vital for improving community well-being and leading to sustainable outcomes. In these groups, social capital is both operational and effective.

(a) *Watershed and catchment management groups*

Governments and nongovernmental organizations (NGOs) have increasingly come to realize that the protection of whole watersheds or catchments cannot be achieved without the willing participation of local people. Indeed for sustainable solutions to emerge, farmers need to be sufficiently motivated to want to use resource-conserving practices on their own farms. This in turn needs investment in participatory processes to bring people together to deliberate on common problems, and form new groups or associations capable of developing practices of common benefit.

This realization led to an expansion in programs focused on micro-catchments—not whole river basins, but areas of probably no more than several hundred hectares, in which people know and trust each other. The resulting uptake has been extraordinary, with most programs reporting substantial yield improvements, often of the order of 2–3 fold. At the same time, most also report the substantial public benefits, including groundwater recharge, reappearance of springs, increased tree cover and microclimate change, increased common land revegetation, and benefits for local economies. We estimate that some 50,000 watershed and sustainable agriculture groups have been formed in the past decade in Australia, Brazil, Burkina Faso, Guatemala, Honduras, India, Kenya, Niger, and the USA (Pretty, 1995b; IATP, 1998; Bunch, 1999; Hinchcliffe, Thompson, Pretty, Guijt, & Shah, 1999; F. Shaxson, S. Hocombe, A. Mascaretti, personal communication 1999; National Landcare Programme, 1999; Pretty & Frank, 2000).

(b) *Irrigation and water users’ groups*

Although irrigation is a vital resource for agriculture, water is rarely used efficiently and

Table 2. *Social capital formation in natural resource management sectors (selected countries only)*^{ab}

Country and programme details	Numbers of local groups
<i>Watershed and Catchment Groups</i>	
—India—programs of state governments and NGOs in Rajasthan, Gujarat, Karnataka, Tamil Nadu, Maharashtra, Andhra Pradesh	30,000
—Brazil—275,000 farmers in 3 southern states adopted zero-tillage and conservation farming as part of microbasins (watersheds) groups	15,000–17,000
—Australia—national Landcare programme with about one third of farmers in landcare, waterwatch and coastcare groups	4,500
—Kenya—Ministry of Agriculture catchment approach to soil and water conservation	3,000–4,500
—Honduras/Guatemala—NGO programmes for soil and water conservation and sustainable agriculture	700–1,100
—USA—farmer-led watershed initiatives	1,000
—Burkina Faso/Niger—water harvesting programmes	3,000
<i>Irrigation water users' groups</i>	
—Sri Lanka—Gal Oya and Mahaweli authority programs	33,000
—Nepal—water users groups as part of government programs	5,000–8,000
—India—participatory irrigation management in Gujarat, Maharashtra, Tamil Nadu and Orissa	1,000
—Philippines—National Irrigation Administration turned over 1.2 m ha to local management groups	3,500–5,000
—Pakistan—water users' association in Punjab and Sindh	14,000
<i>Microfinance institutions</i>	
—Bangladesh—Grameen Bank nationwide	50,000
—Bangladesh—Proshika groups	75,000
—Pakistan—Aga Khan Rural Support Programme in Northern Areas	2,600
—12 Countries (Nepal, India, Sri Lanka, Vietnam, China, Philippines, Fiji, Tonga, Solomon Islands, Papua New Guinea, Indonesia and Malaysia) with wide variety of bank and NGO programs	127,000–170,000
<i>Joint and Participatory Forest Management</i>	
—India—joint forest management and forest protection committees in all states	15,000
—Nepal—forest users' groups	5,300
<i>Integrated Pest Management</i>	
—Indonesia (1 million graduates trained in rice and vegetable IPM programmes with farmer field schools), Vietnam, Bangladesh, Sri Lanka, China, Philippines, India (a further 800,000 trained)—not all remain in groups	18,000–36,000
<i>Farmers Groups for Research and Experimentation</i>	
—Kenya—organic farming groups	185
—Colombia—farmer research committees	250
—Denmark—pest management groups	620
—Netherlands—farmer study groups for horticulture and arable	500
Total	408,000–478,000

^a The group structures for microfinance institutions in these countries are assumed to be the “center” groups (30–40 members), and not the 5 member subgroups.

^b Sources: see text for references.

effectively. Without regulation or control, water can easily be overused by those who have access to it first, resulting in shortages for tailenders, conflicts over water allocation, and

waterlogging, drainage and salinity problems. But where social capital is well-developed, then local water-users' groups with locally-developed rules and sanctions are able to make more

of existing resources than individuals working alone or in competition. The resulting impacts, such as in the Philippines and Sri Lanka, typically involve increased rice yields, increased farmer contributions to design and maintenance of systems, dramatic changes in the efficiency and equity of water use, decreased breakdown of systems and reduced complaints to government departments (de los Reyes & Jopillo, 1986; Bagadion & Korten, 1991; Ostrom, 1990; Uphoff, 1992; Cernea, 1993; Singh & Ballabh, 1997; Uphoff *et al.*, 1998).¹³

(c) *Microfinance institutions*

One of the great recent revolutions in developing countries has been the development of credit and savings systems for poor families. They lack the kinds of collateral that banks typically demand, appearing to represent too high a risk, so having to rely on money-lenders, who charge extortionate rates of interest. A major change in thinking and practice occurred when professionals began to realize that it was possible to provide microfinance to groups, and so ensure high repayment rates. When local groups are trusted to manage financial resources, they can be much more efficient and effective than banks.

The Grameen Bank in Bangladesh was the first to help people find a way out of the credit trap. It helps women to organize into groups, and lends to these groups. The Grameen Bank now has more than two million members in 34,000 villages, who are organized into subgroups of five members, which are joined together into 40-member centers (Grameen Trust, 1999, *passim*). Elsewhere in Bangladesh, the NGO Proshika has helped to form some 75,000 local groups. Such "microfinance institutions" are now receiving worldwide prominence: the 57 microfinance initiatives (in Nepal, India, Sri Lanka, Vietnam, China, Philippines, Fiji, Tonga, Solomon Islands, Papua New Guinea, Indonesia and Malaysia) analyzed for the Bank-Poor '96 meeting in Malaysia have 5.1 million members in some 127,000–170,000 groups, who had mobilized US\$132 million in their own savings (Fernandez, 1992; Gibbons, 1996).

(d) *Joint and participatory forest management*

In many countries, the forests are owned and/or managed by the state. In some cases, people are actively excluded; in others some are

permitted use rights for certain products. But governments have not been entirely successful in protecting forests. In India, for example, less than half of forests remain under closed canopies, with the remainder in various stages of degradation (SPWD, 1992). But recent years have seen growing recognition among governments that they cannot hope to protect forests without the help and involvement of local communities. This means the granting of rights to use a range of timber and nontimber produce, and allocation of joint responsibility for protecting and improving degraded land.

The most significant changes have occurred in India and Nepal, where experimental local initiatives in the 1980s so increased biological regeneration and income flows that governments issued new policies for joint and participatory forest management in 1990 (India) and 1993 (Nepal). These encouraged the involvement of NGOs as intermediaries and facilitators of local group formation. There are now nearly 20,000 forest protection committees and forest users' groups in these two countries, managing some 1.85 million hectares of forest, mostly with their own rules and sanctions (Malla, 1997; Shrestha, 1997, 1998; SPWD, 1998; Raju, 1998).¹⁴ Benefits include increased fuelwood and fodder productivity, improved biodiversity in regenerated forests, and income growth among poorest households. Old attitudes are changing, as foresters come to appreciate the remarkable regeneration of degraded lands following community protection, and the growing satisfaction of working with, rather than against, local people (though some 31 million hectares of forest are still said to be degraded in India).

(e) *Integrated pest management and farmer field schools*

Integrated Pest Management (IPM) is the integrated use of a range of pest (insect, weed or disease) control strategies in a way that reduces pest populations to satisfactory levels and is sustainable and nonpolluting. Inevitably IPM is a more complex process than relying on spraying of pesticides: it requires a high level of human capital in the form of analytical skills and understanding of agro-ecological principles; it also requires cooperation between farmers. Recent years have seen the establishment of "farmer-field schools" (FFS) ("schools without walls," in which a group of up to 25 farmers meets weekly during the rice season to

engage in experiential learning) and farmers' groups for IPM (Kiss & Meerman, 1991; Matteson, Gallagher, & Kenmore, 1992; Eveleens *et al.*, 1996; van de Fliert, 1997; Kenmore, 1999).

The FFS revolution began in South East Asia, where research on rice systems demonstrated that pesticide use was correlated with pest outbreaks rice (Kenmore, Carino, Perez, Dyck, & Gutierrez, 1984).¹⁵ The loss of natural enemies, and the free services they provided for pest control, was a cost that exceeded the benefits of pesticide use. The program of FFS is supported by FAO and other bilateral development assistance agencies and has since spread to many countries in Asia and Africa (Kenmore, 1999; Desilles, 1999; Jones, 1999). At the last estimate, some 1.8 million farmers are thought to have made a transition to more sustainable rice farming as a result. FFS have given farmers the confidence to work together on more sustainable and low-cost technologies for rice cultivation. But it is not clear how many graduates remain connected up in local groups. We assume that only 25–50% of the 1.8 million graduates remain in groups.

(f) *Farmers' groups for co-learning and research*

The normal mode of agricultural research has been to experiment under controlled conditions on research stations, with the resulting technologies being passed to farmers. In this process, farmers have little control, and many technologies do not suit them, thus reducing the efficiency of research systems. Farmers' organizations can, however, make a difference. They can help research institutions become more responsive to local needs, and can create extra local value by working on technology generation and adaptation. Self-learning is vital for sustainable agriculture, and by experimenting themselves, farmers increase their own awareness of what does and does not work. There have been many innovations in both industrialized and developing countries, though generally the numbers of groups in each initiative tend to be much smaller than in watershed, irrigation, forestry, microfinance and IPM programs (Pretty, 1995a,b; Harp *et al.*, 1996; Oerlemans, Proost, & Rauwhost, 1997; van Weperen & Röling, 1995; van Veldhuizen, Waters-Bayer, Ramirez, Johnson, & Thompson, 1997; Just, 1998; Braun, 2000; Pretty & Hine, 2000).

5. THE MATURITY OF GROUPS AND SOCIAL AND HUMAN CAPITAL TRANSFORMATIONS

It is clear that there has been a quite remarkable emergence of social capital manifested in groups and associations worldwide. Some natural resource sectors are being transformed: such as forest management in India, with 15,000 forest protection committees, or participatory irrigation in Sri Lanka with 33,000 groups. Some countries or regions are being transformed: a third of all Australian farmers are members of 5000 Landcare groups; and there are some 1.8 million Southeast Asian farmers engaged in sustainable rice management.

The fact that groups have been established does not, however, guarantee that resources will continue to be managed sustainably or equitably. What happens over time? How do these groups change, and which will survive or terminate? Some will become highly effective, growing and diversifying their activities, whilst others will struggle on in name only. Can we say anything about the conditions that are likely to promote resilience and persistence? There is surprisingly little empirical evidence about the differing performances of groups (though see Bunch & López, 1996 for Honduras and Guatemala; Bagadion & Korten, 1991 for Philippines; Uphoff *et al.*, 1998 for Sri Lanka; Krishna & Uphoff, 1999 for Rajasthan, India; and Curtis, van Nouhays, Robinson, & MacKay, 1999 for Australia). These variously show reasonably normal distributions from low-performing to mature high-performing groups, or very skewed distribution to either end.¹⁶

Many models have been developed to describe changes in social and organizational structures, commonly characterizing diversity in structure and performance according to stages or phases.¹⁷ Some of these focus on organizational development of business or corporate enterprises, with a particularly strong emphasis on the life cycles of groups (cf. Mooney & Reiley, 1931; Stinchcombe, 1965; Greiner, 1972; Child & Keiser, 1981; Handy, 1985). Others focus on the phases of learning, knowing and world-views through which individuals progress over time (cf. Argyris & Schön, 1978; Habermas, 1987; Collins & Chippendale, 1991; Lawrence, 1999). Moreover some point to the types of participation that development organizations engage in while

Table 3. Three stages in the evolution of groups according to 15 criteria

	Stage 1	Stage 2	Stage 3
	Reactive-dependence	Realisation-independence	Awareness-interdependence
1. <i>Worldviews and sense-making</i>			
1.1 Sense-making	—Individuals in group tend to be looking back—making sense of old realities —Fear of change —No significant change in attitudes, beliefs and values	—Individuals and group looking inwards—making sense of new reality —Adjusting to change —Realisation of new capacities	—Group self-determined and shaping reality by looking forward —Expect change as a norm —Critical reflection and abstract conceptualisation lead to new insights
1.2 Views of change			
1.3 Attitudes and values			
2. <i>Internal norms and trust</i>			
2.1 Rules and norms	—Tend to be externally imposed or derived	—Development of own rules and norms	—Evolution and strengthening of rules and norms
2.2 Recognition of group value	—Some recognition that group has value to achieve something new	—Members increasingly willing to invest in group itself	—Group likely to express social value of group
2.3 Sharing ethic	Some sharing of ideas, but tendency to mistrust the new	—Sharing within group common	—Sharing to and from external actors
3. <i>External links and networks</i>			
3.1 Horizontal	—Few or no links with other groups	—Links with other groups	—Groups capable of promoting spread and initiating new groups
3.2 Vertical	—Links one way (from above to below)	—Realization that information can flow upward	—Groups well-linked to many external agencies and strong enough to resist external power
3.3 External facilitators	—Group relies on external facilitators to sustain group activities	—New role for facilitators, such as conflict resolution	—Facilitators no longer needed
4. <i>Technologies and improvements</i>			
4.1 Environmental aspects	—Eco-efficiency-reducing costs and damage	—Regeneration—making best of natural capital	—Redesign according to basic ecological principles
4.2 Source of technologies	—Waits for external solutions-hoping for a new silver bullet	—Realization that solutions must be internally generated	—Internal and external solutions
4.3 Capacity to experiment	—Some experimentation and adoption	—Collective planning for experimentation; some innovations	—Experimentation leads to adaptation and innovation
5. <i>Group life span</i>			
5.1 Reason for being	—Initiated by external agency or emerging	—Grouping successfully achieve planned activities	—Groups now engaged in different activities
5.2 Resilience	—Breakdown easy	—Breakdown possible after achievement of initial goals	—Unlikely to breakdown-passed a threshold
5.3 Variability	—Groups with same program look the same	—Groups diverge	—Groups look completely different from each other

interacting with their clients, partners or subjects (cf. Rölöing, 1988; Pretty, 1995b; World Neighbors, 1999).

These models have five things in common:

—They describe how transformations in human and social capital occur, but not necessarily why.

—They are essentially progressive, indicating that one stage can lead to another.

—Progression is not taken to be inevitable, with outcomes being regression (going back to the previous stage), stagnation or arrested development (remaining at one stage), and extinction (organizations may fail or terminate).

—Organizations in higher or later stages are taken to be more resilient (capable of resisting shocks and stresses), and more adaptive (capable of innovating), and so have lower mortality rates.

—All relate some measures of group maturity to performance and outcomes, with high or later stages being associated with greater maturity.

We have developed a new typology to describe the evolution of social and human capital manifested in groups. We propose that groups can be found to be at one of three stages: Reactive-Dependence; Realization-Independence; and Awareness-Independence, and that these stages can be differentiated according to 15 criteria clustered in five themes (see Table 3):

—Worldviews of members.

—Internal norms and trust.

—External linkages and networks.

—Technologies and improvements.

—Group lifespan.

(a) *Stage one: reactive-dependence*

When groups form, they do so to achieve a desired outcome. This is likely to be in reaction to a threat or crisis, or as a result of the prompting of an external agency. They tend at this stage to be looking back, trying to make sense of what has happened. There is some recognition that the group has value, but rules and norms tend to be externally-imposed or borrowed. Individuals are still looking for external solutions, and so tend to be dependent on external facilitators. There is an inherent fear of change—really members would like things to return to before the crisis arose and the need to form a group occurred.

For those groups concerned with the development of more sustainable technologies, the

tendency at this stage is to focus on eco-efficiency by reducing costs and damage: in agriculture, for example, this will mean the adoption of reduced-dose pesticides and targeted inputs, but not yet the use of regenerative components.

(b) *Stage two: realization-independence*

The second stage sees growing independence, combined with a realization of new emerging capabilities. Individuals and groups tend to look inwards more, beginning to make sense of their new reality. Members are increasingly willing to invest their time in the group itself as trust grows. Groups at this stage begin to develop their own rules and norms, and start to look outward—they develop horizontal links with other groups and realize that information flowing upward and outward to external agencies can be beneficial for the group.

With the growing realization that the group has the capacity to develop new solutions to existing problems, individuals tend to be more likely to engage in active experimentation and sharing of results. Agricultural approaches, for example, start incorporating regenerative technologies to make the best use of natural capital rather than simple eco-efficiency. Groups are now beginning to diverge and develop individual characteristics. They are stronger and more resilient, but still may eventually breakdown if members feel they have achieved the original aims, and do not wish to invest further in achieving new ones.

(c) *Stage three: awareness-interdependence*

This stage involves a ratchet shift for groups—they are very unlikely to unravel or, if they do, individuals have acquired new worldviews and ways of thinking that will not revert. Groups are engaged in shaping their own realities by looking forward (bringing forth a new world—cf. Maturana & Varela, 1982), and the individual skills of critical reflection (how we came here) combined with abstract conceptualization (how would we like things to be) means that groups are now expecting change and are more dynamic.

Individuals tend to be much more self-aware of the value of the group itself (the value of social capital). They are capable of promoting spread of new technologies to other groups, and of initiating new groups themselves. They want to stay well linked to external agencies,

and are sufficiently strong and resilient to resist external powers and threats.¹⁸ Groups are more likely to come together in apex organizations, platforms or federations, to achieve higher level aims. At this stage, agricultural systems are more likely to be redesigned according to ecological principles, no longer adopting new technologies to fit the old system, but innovating to develop entirely new systems.

This typology suggests important relationships between maturity and social capital. Are groups endowed with social capital more likely to proceed to maturity, or can they become arrested because social capital is a form of embeddedness that prevents change? Does feedback occur between maturity and social capital? If so, is it positive (e.g., success with a new sustainable practice spills over into success for others, or create new opportunities for cooperation), or negative (e.g., changes in worldview and technology could unsettle traditional practices, erode trust, and make existing networks redundant)?

An important, and as yet unanswered, question is whether this typology is a construct that accurately describes discrete stages, or whether there is in reality a continuum of steady change. We suspect real-life situations represent a great diversity of degrees of more or less of several indicators at each stage. We suspect, however, that there are likely to be one or more distinct thresholds or ratchets along the continuum. Groups and individuals at stage 3 appear unlikely to regress to a previous stage, as worldviews, philosophies and practices have fundamentally changed. But groups at stage 1 are unstable and could easily regress or terminate without external support and facilitation.

These issues raise further questions about what can or should external practical and policy agencies do—can they create the conditions for take-off towards maturity when there is little social capital? How best should they proceed in encouraging transformations that will lead to sustained progress?

6. POLICY CHALLENGES

What, then, can be done both to encourage the greater adoption of group-based programmes for environmental improvements, and to identify the necessary support for groups to evolve to maturity? Clearly, international agencies, governments, banks and NGOs must invest more in social and human capital

creation, and to ensure the transition is made from dependence to interdependence, which in turn helps to build assets. The danger is not going far enough, and being satisfied with any partial progress: as Ostrom (1998) puts it: “creating dependent citizens rather than entrepreneurial citizens reduces the capacity of citizens to produce capital.” The costs of development assistance will also inevitably increase—it is not costless to establish new organizations. It is clear that more will have to be invested on public social goods to get more improvements in natural capital.

But group-based approaches that help build social and human capital are not alone sufficient conditions for achieving sustainable livelihoods and local economies. Policy reform is an additional and necessary condition for shaping the wider context, so as to make it more favorable to the emergence and sustenance of local groups. There have been some notable examples of such policy support in recent years:

—In India and Nepal, the granting in the early 1990s by national governments of access rights and concessions to forest products for community groups was fundamental to the emergence of 20,000 new users’ groups.

—In Indonesia, the banning of 57 pesticides in 1986 combined with the establishment of a national farmer-field school programme was vital in launching the successful rice-IPM program.

—In Sri Lanka, the adoption of participatory irrigation management with water users’ groups became national policy in 1988.

—In Kenya, the success of the government’s soil conservation program has clearly followed new government policy from the late 1980s that permitted community groups to plan and prioritize for themselves.

—In Australia, the government’s decade of Landcare (launched in 1989) helped propel landcare groups to the centre of farming and rural communities.

—The emergence of microfinance institutions primarily targeted at the poorest and excluded groups is in part due to policy reforms permitting groups to receive credit and themselves act as the collateral.

Equally, though, there are many cases where a lack of policy reform, or even discriminatory policies, have meant disruption or degradation of institutions and programs concerned with making progress toward sustainability. In parts

of the Philippines, for example, many tenant farmers' groups who have improved their local natural capital through sustainable agriculture have found that this has simply encouraged landlords to take back the formerly degraded farm without paying compensation for the improvements.

One way to ensure the stability of social capital is for groups to work together by federating to influence district, regional or even national bodies. This can open up economies of scale to bring greater economic and ecological benefits. The emergence of such federated groups also makes it easier for government and NGOs to develop direct links with the poor. This can in turn result in greater empowerment of poor households, as they better draw on public services. Such interconnectedness between groups is more likely to lead to improvements in natural resources that regulatory schemes alone (Röling & Wagemakers, 1997; Baland & Platteau, 1999).

These policy issues also raise further questions. What will happen to state-community relations when social capital in the form of local associations and their federated bodies spread to very large numbers of people? Will the state colonize these groups, or will new broad-based forms of democratic governance emerge? How can policy-makers protect existing programs in the face of new threats?

Important questions also relate to the groups themselves. "Successful" programs may falter if individuals start to "burn-out"—feeling that investments in social capital are no longer paying. It is vitally important that policy-makers and practitioners continue to seek ways to provide support for the processes that both help groups to form, and help them mature along the lines that local people desire and need, and from which natural environments will benefit.

NOTES

1. In Malaysia, water users' associations were "established carefully, patiently and successfully, taking into account farmers' resource needs, their willingness to cooperate, the physical location of their plots" (Cernea, 1987). The endurance of these associations after the project completed was the single most important factor in ensuring the continued benefits to farmers. In contrast, the negative rate of return of an agricultural project in Benin was caused by the disintegration of the cooperatives developed for the cultivation of oil palm. These had been imposed on the farmers and run by a parastatal with no self-management delegated to farmers. The farmers also opposed the organizational arrangements imposed on them, so when these collapsed, the technical innovation (growing of oil palm) collapsed, too.

2. Many environmental goods are complex mixtures of public, club and private goods that are jointly supplied. Club goods are those that are indivisible and "outsiders" are often excluded from the benefits. Not all environmental goods are excludable, though, such as the benefits of preserving the ozone layer, which cannot be confined to club members (Sandler, 1997).

3. Although it is impossible to give an absolute value to some aspects of natural capital—the atmosphere, for example, has infinite value to us—it is instructive to see how much the services that come from the capital are

worth (at least, those that can be costed in economic terms) (Pimentel *et al.*, 1995; Daily, 1997). Costanza *et al.* (1997) study of the aggregate value of the world's ecosystem services, estimate it to be in the range US\$16–54 trillion per year.

4. This economic metaphor has drawbacks in relation to social capital: relationships are not entirely oriented toward material gain. Other benefits generated through social capital may include enhanced spiritual well-being, a sense of identity and belonging, the pleasure of friendship, honor, social status and prestige. It is important, therefore, to take account of the cultural, moral, ethical and spiritual dimensions in which such assets are embedded (Benton, 1998).

5. A problem with the term social capital, like many others in current vogue (such as "sustainable development" or "participation"), is that it is difficult to find agreement on exactly what it is. Since the appearance of the Putnam thesis on Italian society and other commentaries on the decline of social capital in the United States (Putnam, 1993, 1995, 1996), a wide range of different contributions have been made on the concept of social capital, with some clearly seeing little use for the term (cf. Fine, 1998). Some have sought to deconstruct the Putnam thesis (Levi, 1996; Harriss & de Renzio, 1998). Some have emphasized the importance of problem-solving and how only certain types of social capital

contribute to this (Boyte, 1995; Sirianni & Friedland, 1997). Some have analyzed the values of organizational density and intensity, and the value of associational activity (Cernea, 1993; Narayan & Pritchett, 1996; Ward, 1998), while others distinguish between structural and cognitive aspects (Uphoff, 1998), or the relations between social capital and entrepreneurial social infrastructure (Flora, 1998). Some are concerned with the use of the term “capital,” as it appears to imply that only monetary measures of society are important (Benton, 1998), or that there is complete substitutability (Bourdieu, 1986) between types of capital. Some indicate how participatory processes that encourage co-learning can lead to social capital accumulation (Pretty, 1995b; Norton & Stephens, 1995; Röling & Wagemakers, 1997), while others point to the “dark side” of social capital, in that it can mean exclusion as well as inclusion (Portes & Landolt, 1996).

6. Fukuyama (1995) emphasizes the fundamental value of trust for the progress of large, democratic and corporate organizations. Trust is seen to arise when communities share sets of moral values so as to create expectations of honest behavior.

7. Rose (1995) draws attention to the Russian proverb “it’s better to have one hundred friends than 100 roubles” in his study of Russian people’s high trust and reciprocity among immediate social networks, but high distrust and disconnectedness with higher-level institutions.

8. High social capital implies a likelihood of multiple membership of organizations and links between groups. It is possible to imagine a context with large numbers of organizations, but each protecting its own interests with little crosscontact. Organizational density may be high, but intergroup connectedness low (Cernea, 1993). A better form of social capital implies high organizational density and crossorganizational links.

9. This is not to say that regulations have no effect—without them, farmers, rural communities and consumers would be exposed to many more types of toxic pesticide, for example, than is currently the case.

10. It is clear from the extent of group-based programs that something is working. But, in most cases, it is not possible to say exactly what is the added value of the social capital formed, as most comparisons can only be of a “before-and-after” nature. Something did not work, and now it does, and so we can draw assumptions about the likely reasons. But the question of attribution is always difficult with such changes over time. We can never be sure as to what extent the measured changes are

due to the program interventions. It seems likely—but other factors may have been equally or more important, such as changes in policies, technologies or labor markets.

11. The World Bank’s internal “Learning Group on Participatory Development” conducted a study to measure the comparative benefits and costs of participatory versus nonparticipatory projects (World Bank, 1994). The principal benefits were found to be increased uptake of services; decreased operational costs; increased rate of return; and increased incomes of stakeholders. But it was also found that the costs of participation were greater, notably that the total staff time in the design phase (42 projects) was 10–15% more than nonparticipatory projects, and that the total staff time for supervision was 60% more than nonparticipatory projects (loaded at front end). The costs were primarily for convincing borrowers of value of participation; for conducting extensive institutional assessments; for building capacity and social institutions; for running interactive workshops and making field visits; and for negotiating between stakeholder groups.

12. Other important advances in social capital creation not dealt with here include groups for drinking water provisions (e.g., 13,500 groups in Côte d’Ivoire), food consumer groups (e.g., 25,000 *teikei* and *sanchoku* groups in Japan), fishery management (e.g., 8,400 fishing cooperatives in India) and wildlife management groups (e.g., in Zimbabwe) (cf. Baland & Platteau, 1996)

13. Lam, 1998 analysis of 150 irrigation systems in Nepal (reported in Ostrom, 1998) indicates that “irrigation systems that are governed by farmers themselves... deliver more water to the tail end of the system and have higher productivity than those... governed by the Nepal Department of Irrigation” (Ostrom, 1998).

14. The growth of forest users’ groups in Nepal illustrates the rapidity of this new movement: in 1988 there was one FUG; in 1990, about 90; in 1993 there were 469 groups; and by 1997, this had grown to 5316 (Malla, 1997).

15. Pesticide use has since been positively correlated with pest outbreaks in other systems, such as maize and vegetables in Australia (cf. Heisswolf, Houlding, & Deuter, 1996; Scholz, Monsour, & Zalucki, 1998).

16. An analysis of 112 villages of Honduras and Guatemala found that 20–35% of communities were highly effective; 40–50% were in the middle; and about

25–30% were low performers. The best communities were associated with continued yield increases long after the sustainable agriculture project terminated; the low performers showed no real change after project termination, though agricultural yields were significantly better than those of farmers not in groups or part of the programme (Bunch & López, 1996; Bunch, 1999). In the Philippines, only about 3% of irrigators' associations have entered into full turnover contracts in which they manage all the processes of irrigation management and distribution; 37% have entered maintenance contracts; and 60% are engaged in systems operation, but still requiring substantial external support (Bagadion & Korten, 1991). In Sri Lanka, autonomous, isolated irrigation groups perform least well; those with narrow vertical linkages but no horizontal ones performed next; while those with multiple horizontal and vertical linkages performed best (Uphoff *et al.*, 1998). In Australia, Victorian landcare groups answering a survey were found to be mostly highly effective (Curtis *et al.*, 1999). In Rajasthan, Krishna and Uphoff's (1999) development of a social capital index for 64 rural communities showed a normal distribution.

17. These typologies relating to the evolution and maturity of groups include:

- (i) Mooney and Reiley's (1931) five stages of group life-cycles: emergence, growth, maturity, decline and death;
- (ii) Greiner's (1972) five stages for group life-cycles: entrepreneurial, collectivity, delegation, formalisation, and collaboration;

- (iii) Argyris and Schön's (1978) four stages of learning: from propositional to single loop and double-loop, to higher order epistemic;
- (iv) Child and Keiser's (1981) four stages of business development model;
- (v) Handy's (1985) four stages of groups: forming, storming, norming and performing;
- (vi) Habermas' (1987) focus on cognition: technical, practical and emancipatory cognition;
- (vii) Rölöing's (1988) classification of extension in four stages: persuasive, informative, formative, and emancipatory extension;
- (viii) Pretty's (1995a) seven levels of participation: manipulative, passive, consultative, bought, functional, interactive and to self-mobilization;
- (ix) World Neighbors' (1999) four stages to identify the nature of the wider development process; initiation; co-management; accompaniment; and autonomy;
- (x) Lawrence's (1999) typology of learning: teaching, teaching and training; adult education; adult learning; to perspective integration (ontological appreciation).

18. It is often part of the rhetoric of development that external agencies should have an "exit strategy" — a time or rationale for leaving local people to continue on their own. This is a mistaken idea based only on the notion of groups moving from dependence to independence. In practice, mature groups never want external agencies to leave—they wish to make the best use of all the linkages that they have developed. The external agency, however, may need to exit for financial or administrative reasons.

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