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March 1991

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The technical feasibility of culturing giant clams for food and for restocking tropical reefs was established in an earlier ACIAR project. This project is studying the economics of giant clam mariculture, to determine the potential for an industry. Researchers will evaluate international trade statistics on giant clams, establish whether there is a substantial market for them and where the major overseas markets would be. They will determine the industry prospects for Australia, New Zealand and South Pacific countries, and which countries have property right factors that are most favourable for commercial-scale giant clam mariculture. Estimates will be made of production/cost functions intrinsic in both the nursery and growth phases of clam mariculture, with special attention to such factors as economies of scale and sensitivity of production levels to market prices.

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Aid for Village-Based Rural Projects in LDCs: Experiences, Project Appraisal and Selection, ACIAR and Giant Clam Culture as a Case

ABSTRACT

Historically project aid has favoured urban and infrastructure projects. Its benefits to rural dwellers (in most LDCs, the majority of the population) seem to have been minimal. In encouraging urbanisation, it has added to urban environmental and development problems in LDCs. Village-based rural projects have been neglected in dispensing aid, it seems for a variety of reasons some of which are identified here.

Apart from the above bias, most project aid tends to be delivered on a top-down basis and donors often treat aid for development projects mechanically and simply as a means of delivering goods and services. ‘Organic’ factors such as local needs, culture, political considerations and the state of the natural environment are frequently not taken into account by donors. In the past, also little attention has been given to the sustainability of benefits from projects. Expert evaluation of large-scale development projects indicate high rate of 'failure' in relation to target rates of return and sustainability of returns. This may suggest that other types of projects such as rural small-scale projects are more desirable or that different techniques of project appraisal and selection should be adopted. For instance, techniques which take account of sustainability of returns or methods of selection that involve input from the village-level may be preferable.

Selection techniques such as the use of cost-benefit analysis (CBA) are discussed and particular attention is given to the suggestions of Pearce, Markandya, Barbier (1989) of ways to extend CBA to take account of sustainability factors in project appraisal.

This is followed by a general discussion of the role of project aid in promoting sustainable development in the Pacific. The role of the Australian Centre for International Agricultural Research (ACIAR) in promoting rural based development via research is noted. By way of a case study, particular attention is given to ACIAR's role in developing and promoting giant clam (Tridacnid) culture as a means of rural (coastal.) development.

Keywords: Australian Centre for International Agricultural Research (ACIAR), LDCs, project aid, sustainable development.

JEL Classification: Q57, Q31

1. Introduction

The debate over the success or failure of development projects has often concentrated on the issue of appropriate scale, contrasting the benefits of small-scale projects with large-scale ones. Successful implementations of small-scale projects have been reported by several authors (e.g. Jacobi, 1987) while others have pointed out at failures of large-scale projects; however, project success is by no means related only to the scale. Adams (1990) has shown that both large-scale and small-scale irrigation projects in Kenya have failed because the farmers did not initiate and control the projects; he observes that project scale is of little relevance to success. Nevertheless, it will be argued that the scale of a project should be taken into account when planning for sustainability and in order to maximise the gains of beneficiaries' from projects.

The debate on sustainable development has highlighted the need to take a holistic approach to development. Until recently sustainability has not been a donors' objective (Morss et al., 1985), and the recent interest in it has led to the use of the term indifferent contexts with different meanings. An attempt to clarify the meanings of 'sustainability' in project aid literature is made.

Planning for sustainable projects requires the modification of the tools used for project analysis and selection and perhaps the design of new ones. A recent proposal to integrate sustainability in cost-benefit analysis (Pearce et al., 1989) is found to be flawed. Some limitations of the agroecosystem analysis approach (Conway, 1985; 1987) are also outlined.

Australian foreign aid has a role to play in making development in the Pacific sustainable; it is however important to focus not only on the sustainability of a single project but also on its contribution to the overall development. It is argued that a shift away from infrastructural projects to rural oriented projects might be required.

2. Nature of Project aid

During the 1950s and the 1960s, donor countries favoured the implementation of large infrastructural projects with an urban bias; LDCs were seen as backward economies needing to develop the modern sector to achieve higher growth rates. The majority of the rural population did not benefit from this approach to development as trickle-down effects did not eventuate (Arndt, 1983). The neglect of the rural sector has also encouraged urbanisation of the population in many LDCs, a phenomenon not extraneous to the Pacific countries (McKee and Tisdell 1990). Evidence[1] shows that rural infrastructural projects benefited mostly the wealthier members of the rural communities increasing income inequalities.

During the 1970s, donor countries increased the number of rural development projects focusing on the rural poor. However, the importance of project aid as a form of assistance to LDCs declined during the 1980s. Several factors seem to have contributed to this reduction. Lipton (1986) argues that during the late 1970s and early 1980s recipient countries could not afford imports to run the existing projects; there was therefore no scope for starting new projects. Also, donors felt that policies implemented by recipient countries were limiting the effectiveness of project aid and recipient governments realised that project aid had higher costs compared to program aid (Lipton, 1986). Another factor that induced donor countries to decrease project aid was the large number of project failures or limited successes registered.

Most ex-post evaluation studies of projects have analysed large-scale production projects, focusing particularly on projects implemented by the World Bank. Howell (1990), analysing integrated rural development projects started by the World Bank in the early 1970s in Africa, reports that ‘over 54% of the projects were 'failures' - that is, they had rates of return below 10%.’ (Howell, 1990 p. 275); these findings are supported by Peek (1988). This evidence confirms the high rate of failure of projects as judged by economic rates of return.

Failure of a project is judged on the basis of the internal rate of return measured at completion of the project. Two issues should be noted. Firstly, a positive IRR (usually greater than 10%) does not mean that the project has achieved project targets; Peek (1988) observes that many apparently successful World Bank poverty oriented projects failed to improve the living conditions of the poorest members of society. Secondly, sustainability of the projects was not an issue addressed by the donors or in the above mentioned assessments. Cernea

[1] See Peek (1988) for a brief review

(1987) carried out a sustainability[2] study on twenty-five World Bank agricultural projects initiated in Africa, Latin America and Asia between 1969 and 1975; these projects had been found successful and with good long term prospects by an internal audit carried out at the time of completion. However, Cernea (1987) found that only twelve projects out of twenty-five had achieved 'sustainability', with the lowest rate of success being in Africa. Sustainability has been defined in several ways and there appears to be the need to clarify its different definitions and uses at a project level.

3. Purposes of Project Aid, Including Sustainability

Most might agree that development projects should 'generate self-sustaining improvements in human well-being' (Morss et al., 1985 p. 217); however, differing views on the meaning of well-being and the processes required to improve it are prevalent.

The conventional approach sees a project as a means 'to push the production possibility curve outwards' (Coverdale and Healy, 1987, p. 100). The development question is a technical-managerial problem and the aim of the project is to increase the production[3] of goods and services. An improvement in well-being is often equated with increased production of goods and services. The social process through which the goals of the project are to be achieved is usually considered to be irrelevant. Sociological factors are seen as peripheral to the project but should be investigated 'so that projects introduced by 'outsiders' are likely to be consistent with local 'felt needs' and less likely to have perverse social effects' (Coverdale and Healy, 1987 p. 106). Income distribution effects, an important feature of development projects, are neglected by the conventional approach. Social cost-benefit analysis (the appraisal method advocated by the conventional approach) provides for the analysis of income distribution effects[4] but in practice 'the effects of a project on the distribution of income are not included in the formal analysis' Squire (1988, p. 1126). Environmental effects of projects are usually not taken into account in the appraisal analysis[5].

[2] Sustainability was defined as 'the maintenance of an acceptable net flow of benefits from the project's investments after its completion' (Cernea, 1987, p. 3).
[3] Notice that increased production does not always lead to increased local consumption; for example, forestry projects have sometimes led to a decreased availability of fuel wood for the local people, because the wood is sent to outside markets.
[4] This theory is, however, much disputed: see for example Steward (1975).
[5] The extension of social cost benefit analysis methodology to include impacts on the natural environment will be dealt with later on.

The conventional approach is usually in terms of present discounted value or internal rate of return computed for a relatively short period and it considers sustainability. When project sustainability is accounted for, it does not refer to the natural environment and local social system; political, technical and managerial elements of the projects are the only ones considered.

Alternative approaches to development are filtering through to project aid practice. In this alternative view of the development process there is, in the words of the President of the United Nations University Soedjatmoka, "an increasing emphasis on human beings and the human potential as the basis, the means, and the ultimate purpose of the development effort" (cited in Abeysinghe, 1990). In this context, well-being is not only a function of the quantity of produced goods and services available, but it also depends on security (e.g. wealth, secure rights to land) (Chambers, 1988) on non-materialistic elements such as self-esteem (Goulet, 1971) and on natural environment services. Project sustainability has now a broader meaning than in the conventional approach. What matters is the enhanced ability of the beneficiaries of a project to use sustainably the local resources (human and material) and those made available by the project to maintain their increased well-being.

The recent literature on sustainable development points out that the biological system, the economic system and the social system are inter-related and important components of the development process. (Sachs 1987; Barbier, 1987). Barbier sees sustainable development as the maximisation of the human ascribed goals across the three systems (Table 1), through a process of dynamic trade-offs.

Table 1: Human ascribed goals of a system

Biological system goals:
- genetic diversity
- resilience
- biological productivity

Economic system goals:
- satisfying basic needs (reducing poverty)
- equity-enhancing
- increasing useful goods and services

Social system goals:
- cultural diversity
- institutional sustainability
- social justice
- participation

Source: Barbier (1987)

However, as acknowledged by the author himself, Barbier (1987) does not offer an operational definition of sustainable development; this is partially due to the overstated significance of the trade-offs existing between the three systems. Barbier's approach is in the stream of what Colby (1990) defines the 'resource management paradigm' where ecology and sociology are being 'economised'. Biological diversity, cultural diversity, institutions, participation can be traded for economic goals and the role of economics is seen as being to assess costs and benefits of such trade-offs. This position has important implications for future research on sustainability. The above approach implies that in order to sustainable development operational, a priority is the need to develop techniques for analysing the trade-offs (Barbier, 1987), such as extended SCBA.

Trade-offs always exist in decision-making but their relevance is overstated when the ethic supporting the decision-making process does not provide clear priorities to be adhered to and when the characteristics and the eventual hierarchy between factors involved in the trade-offs are not well known and understood.

The ethic underlying conventional project appraisal mirrors the Western individualistic ethic and accepts environmental degradation if short term benefits arise from a project. However, the pattern of analysis of trade-offs would be modified if the ethic supporting the decision process about a land development, which risks degrading the environment, was that of some indigenous people. For example, the Iroquois take into account the effect of present decisions on the sixth generation (Arnold, 1989), and some Nepali villagers refused economic development in order to protect their mountain (Naess, 1979). The protection of the land and of cultural identity and lifestyle would in such cases be set as an overriding priority and any proposed economic development would only be accepted if consistent with such a priority. The emphasis is therefore more on finding development options that respect the local values set by the beneficiaries than on the assessment of trade-offs between economic development and environmental-cultural factors.

Such an approach is relevant in the Pacific where traditional values are still strong. In the constitution of Papua New Guinea, it is stated that ‘development should take place primarily through the use of Papua New Guinean forms of social, political and economic organisation’ (cited in Baines, 1988). In the Solomon Islands the Government has stated that ‘action will be

taken …. to ensure that social change accommodates and strengthens the values, traditions and the family which is the basic strength in Solomon Islands society' (Solomon Islands Government, 1985, p. 20).

In Barbier's model participation appears as a component of a development project that can be traded-off for other components of the project. Participation can be seen both as a means to achieve project success, or as an end in itself, guaranteeing people's democratic participation in decision-making. In the latter case it cannot be subject to traded-offs. In the former case it might be subjected to trade-off.

Kottak (1985) suggests that participation by beneficiaries in project design and implementation is a fundamental factor in project success and it might also enhance economic efficiency. However, even top-down approaches might also bring success, as in the case of a tree planting project in Niger (Harrison, 1987). In some cases a top-down project could be more efficient from an economic point of view than the participatory approach. Then, should we favour top-down interventions if they are perceived as more economically efficient?

The answer depends on several factors. Firstly, it depends on the definition of 'successful project'. One level of success is the achievement of material goals such as goods and services provided; another definition refers not only to the satisfaction of material needs but also of non-material ones as self-esteem and empowerment. Secondly, we need to look at the role of participation in project aid. Participation allows a two-way flow of information between beneficiaries and the donor agency about local needs, local values, technologies and knowledge. Beneficiaries' participation in all phases of the project is also seen as the only way to achieve the non-material goals of development projects (e.g. Hough and Sherpa, 1989).

Thus, the need for participation to achieve project success can be summarised as in Table 2.

Table 2: Need for participation for project success

	Project Objectives		
	Materialistic	Materialistic and non-materialistic	
	Information*		
	Available	Not available	
Need of participation	NO	YES	YES

*Information is probably never fully complete or full incomplete. 'Available' and 'not available' refer to information sufficiency for project 'success'.

When the project objectives are materialistic and non-materialistic, participation is needed to achieve project success. Participation is also needed when project objectives do not encompass non-materialistic objectives but the needed information is not available. In the previous two cases there is not a trade-off between participation and economic objective because lack of participation would lead to an unsuccessful project. When the information is available, the project could satisfy materialistic objectives without participation.

However social, economic, environmental and political conditions often change during project implementation and if this evolutionary character of a project is recognised, then participation becomes a critical factor for project success, determining the outcomes of this process even when the objectives of the project are materialistic ones and sufficient information to start a project is available.

Participation by beneficiaries profoundly affects the methodology of trade-off analysis, and with it, the direction for further research in order to make sustainable development operational. In the blueprint approach, the donor has to verify and assess the trade-offs amongst the different elements of the project and decide how to address them. In the participatory model, the donor **helps** the beneficiaries in assessing the eventual trade-offs and **suggests** possible solutions. Trying to make sustainable development an operational concept, Chambers (1987) proposes a 'sustainable livelihood security' approach, where sustainable refers to the sustainable use of natural resources. Starting from the people and their needs will assure, according to Chambers (1987), the sustainability of the system. The people are assumed to know and respect their environment and it is mainly the influence of external factors that causes over-exploitation of the environment. The deep knowledge of the environment by local people is now widely accepted and is starting to be documented (e.g. Morauta et al., 1982; Richards, 1985). However, the knowledge of local people is often not

perfect, especially in a changing world. It is only in some cases that people live in complete harmony with the environment, such as tribal people in Amazonia. Deforestation is a phenomenon known since ancient times (Siiriainen, 1990), as well as species extinction to the hands of humans. In many cases new technologies have been introduced leading to over-exploitation of natural resources (Tisdell, 1986), traditional land tenure systems have been altered, people's needs have changed following contact with the Western world.

Thus, in some cases a bottom-up approach might be adopted, in other situations a blend of bottom-up and top-down could be required, given the environmental and cultural conditions, as well as for political economy motivation (Simon, 1989). On the other hand, we should be aware that sometime governments' policies have been the cause of environmental and social disruption; in those cases a blend of bottom-up and top-down might not prove to be viable.

Adams (1990), looking at the performance of irrigation projects in Africa, asserts that control by beneficiaries over projects is the key factor determining project success and that the scale factor is not relevant. It is however, argued here that there are some factors that indicate that the scale of a project should be considered when planning for sustainability.

Large-scale and capital-intensive projects have been and still are favoured by donors and recipient governments alike. Economic benefits for the donors and local elites, political gains by local politicians and bureaucrats, the idea that 'big and modern' means development, the not proven assumption that large projects yield economies of scale (Uphoff, 1990), bias of foreign experts toward high technology and not last the suitability for established appraisal techniques (Chambers, 1978) are some of the many reasons favouring large and capital-intensive projects. However, a large number of those have been unsuccessful not only from an economic point of view, yielding a low ex-post internal rate of return, but also on an environmental and social basis.

The appropriate scale of projects varies with factors specific to each case. Nonetheless, it is possible to outline some issues that should be accounted for when designing a project.

To reduce environmental risks, projects should be designed to minimise unpredictable and irreversible effects on the natural environment. Small-scale projects are usually associated with low environmental risk. However, contrary to Schumacher's claim, it is not always the case that ‘small-scale operations, no matter how numerous, are always less likely to be harmful to the natural environment than large-scale ones’ [emphasis added] (Schumacher,

1974, p.29). Many small dams damage (sometimes they actually have positive effects) the environment less than a large dam but many small-scale logging projects could have the same impact on the environment as a large logging project.

The technology adopted (and the capital investment) should build, whenever possible, on local knowledge of the environment and traditional skills in order to favour a co-evolutionary approach and to allow easier project replicability[6]. The adoption of simple and inexpensive technology should reduce the required investment by beneficiaries and limit their risk of indebtedness.

Large-scale projects normally require modern and capital-intensive techniques that need the intervention of foreign or urban companies leading to a large leakage of benefits (Peek, 1988). Appropriate scale, from an income distribution point of view, might require the adoption of techniques that make possible local business involvement so that the local community receives a larger share of the benefits from the project.

As noted earlier, benefits from large-scale projects have often been appropriated by wealthy and/or powerful members of he community. Appropriate scaling of projects would help in better targeting the proposed beneficiaries (Chambers, 1978). In a World Bank project in Sudan 'seven million acres of natural acacia forest were bulldozed and replaced by a mechanised sorghum monoculture' (Roche, 1989); the scheme was abandoned after three years and the land has to be rehabilitated. Starting at an appropriate scale, in that case a small experimental project, would have allowed earlier abandonment of the project that proved to be a failure because of environmental damage.

Project scale has implications also for the social system. Large-scale, complex and bureaucratic projects tend to make participation by beneficiaries difficult. Local institutions such as some tenure systems cannot adapt to large-scale economic changes. In the Solomon Islands, some large agricultural projects have failed because land disputes (Frazer, 1987).

From an administrative point of view, large projects have to often proved to be too complicated to be managed by local people in recipient countries after control of the project has been transferred from the donor to the recipient country (Rondinelli, 1983). The scale should be such as to allow the recipients to administer the project either from the beginning

[6] In analysing what he calls ‘the fallacy of over innovation’, Kottak (1985) reports that none of the successful World Bank projects sampled aimed at revolutionary changes in smallholders' lives.

or at an early stage. Finally, large-scale projects are not flexible (Lecomte, 1986) and their objectives cannot be adjusted during project implementation; appropriate scale should guarantee more flexibility

4. Techniques of Project Appraisal and Selection

Cost-benefit analysis (CBA) is purported by some economic practitioners to be a scientific method of project appraisal (McAllister, 1980) and as such is advocated as an essential instrument in assessing development projects. A scientific method should give results that can be replicated by other researchers, but this is not the case of CBA where different evaluation teams usually reach different results. This problem arises because of the assumptions that have to be made when carrying out CBA. Those assumptions depend on the researchers' perceptions of the conditions and may be influenced by political pressures. Thus, assessment of project sustainability based on CBA leaves judgement in the hands of few experts who might be subject to political pressure.

CBA involves the problem of not taking into account income distribution effects (e.g. Stewart, 1975; McAllister, 1980). It is data intensive and often data is not available because local means of livelihood are not well known and documented. Applying CBA also has a high opportunity cost in relation to the skilled personnel that have to be diverted from other tasks. These are some drawbacks of the utilisation of CBA in a conventional context. These are amplified when sustainability is taken into account and new ones emerge.

Pearce et al. (1989) suggest that sustainability can be introduced into cost-benefit -analysis by means of a constraint specifying a non-decreasing natural capital stock. However, they argue that it is not feasible to preserve the natural capital stock in each project and suggest that the 'damage' of the projects should be considered at a program level (set of projects). It is argued that the sum of the environmental benefits and damages, expressed in value terms, at the program level should be non-positive. Environmentally enhancing projects could be undertaken in order to compensate for the ‘damaging’ ones.

The perspective of this approach to development is that of 'damage and off-setting repair'. It relies on the ability of human beings to control their environment. In an ecodevelopment perspective (e.g. Glaeser, 1989) each project is assessed individually and each must be environmentally appropriate in itself.

The approach of Pearce to project sustainability depends on the interaction of the biological and economic systems. Impacts of projects on the social system are left out of the analysis. At best, this could give a partial assessment of sustainability. But, even if we accept a definition of sustainability limited to the biological and economic system, problems are still present.

The physical damages (present and future) of each project might have synergistic effects so that valuing each project's costs and benefits separately will not give an adequate assessment of the total impact.

It is assumed that the impact of a project on the environment can be appropriately valued. Some valuation methods use market prices to measure the impact of development projects by looking for example at changes in productivity and value of output or loss of earnings. These methods give an indication of the monetary impact on production given the present use of the environment, the present technology and current prices. This however cannot be considered a valuation of services provided by the environment. Other methods attempt to value the environment by testing the users' and non-users' willingness-to-pay (WTP) or willingness-to-accept (WTA). These methods are even more data and personnel intensive than traditional CBA. Furthermore, WTP and WTA are influenced by present income distribution (McAllister, 1980). But more importantly, they measure the present generation's perceived importance of the environment, based on limited knowledge. This can hardly be taken as an approximate 'value' of the environment. In some cases, these approaches also face problems of application from a cultural standpoint. If the land is owned collectively and is not alienable, and/or there religious-cultural bonds with the land, it is hard to see how a WTP or WTA in money terms can be expressed.

Distributional considerations are left out by this approach. Take the case of the atmospheric pollution in the United States that causes acid rain and loss of forests in Canada. The U.S.A could plant trees to balance the negative effects on the atmosphere but it is Canada that suffers a loss in natural capital. Not only international distribution issues are relevant but also national ones. Logging a forest, building a dam, changing the use of agricultural land will affect groups of people by differing amounts and this should be taken into account. The retention of a fixed natural capital stock does not guarantee sustainability *per se*. The allocation of the natural capital stock could be in conflict with the social and political conditions so that the project (or the program) could prove to be unsustainable (Cf. Tisdell and Broadus, 1989).

Pearce et al. (1989) suggest that the values of the net benefits from individual projects be summed. This allows, for example, the summing of the loss of natural environments arising from road building leading to the city with improved living conditions such as 'reduced noise and improved urban amenity from by-passes' (Pearce *et al*., 1989 p. 129). Reduction in 'natural' environmental stock can therefore be exchanged against increases in the 'artificial' environmental stock.

At an applied level, coordinating a development program in accordance with this sustainability approach is extremely difficult in LDCs. The intervention of several independent donors raises problems of coordination which could make this approach unworkable.

Both income and stock effects should be taken into account in appraising a project but SCBA cannot properly accommodate and evaluate the role of stocks in relation to uncertain events. The loss of a stock-resource, e.g. loss of a forest due to deforestation or loss of land because of mining could be compensated for by a lump sum payment. However, lack of investment opportunities could prevent the beneficiaries from investing; cultural conditions might lead to the people spending the money on consumption goods (e.g. cars or alcohol); loss of the traditional livelihood might also result in cultural disruption and this appears difficult to evaluate.

The "agroecosystem" analysis approach (Conway, 1985; 1987) provides for an adaptive appraisal by allowing for participation by interested parties in the appraisal process. However, some qualifications and comments are in order about this appraisal methodology.

Four characteristics of production systems are considered to be important: productivity, stability, sustainability and equity. In order to incorporate growing concerns about development practices focusing merely on materialistic aspects of development, Conway (1987) extends the definition of system productivity, given in Conway (1985)[7], to include the social, the psychological and the spiritual dimension of well-being. This 'stretching' of the definition of productivity creates an 'asymmetry' as equitability is still defined as 'the evenness of distribution of productivity of the agroecosystem' (Conway, 1987 p. 102). Is it plausible to speak of distribution of psychological, social and spiritual well-being? Or, are they assumed to be proportional to the distribution of goods and services.

[7] 'Productivity is the yield or net income per unit of resource' Conway (1985, p. 35).

Tisdell (1988) notes that Conways' approach does not provide a criterion to choose between different income flows over time as, for example, the net present value measure does. In fact, the agroecosystem methodology could be integrated by cost-benefit analysis in order to measure the 'material' productivity of the system. Economic cost-benefit analysis, instead of SCBA, could be used leaving the measurement of equitability separate. Some complications remain. How are the non-materialistic components of productivity assessed? Who should assess them? Should this measure be integrated with the material productivity index? A social impact assessment could be used in a top-down appraisal fashion but it is unlikely that the indices derived from this analysis could be integrated with NPV or IRR indices. The alternative is a self-evaluation approach whereby the beneficiaries weigh the costs and benefits of the project (worked out with the experts) against the non-materialistic elements of well-being and take the decisions.

A quantitative, unique index of sustainability appears difficult to build. Sustainability, if affected by a mix of factors - some from the biological system, the economic system, the social system and the political system. Clear methods for quantifying political and social factors; and to some extent environmental phenomena and aggregating them with economic elements are yet not available. However, an aggregate measure of sustainability is not necessarily desirable because an unchanged index could conceal an improvement in one of the economic components at the expenses of the environmental components. A set of sub-indices might be preferred.

Eventual trade-offs between the four characteristics of the agroecosystem might exist and the problem of choosing between them arises (Tisdell, 1988). However, as noted earlier, this method allows the interested parties to participate in the evaluation process. Therefore, the role of the 'experts' is not one of mechanically choosing (e.g. based on a fixed rule) between the trade-offs but to mediate between different parties in order to accommodate trade-offs. Obviously, appropriate trade-offs between, say, the biological system and the economic system might still be unresolved. It would be simplistic to assume that by allowing the participation of the beneficiaries in all the phases of the project would automatically result in the choice of an ecologically sustainable project. Hough and Sherpa (1989) have in fact noted that in some circumstances a 'bottom-up' approach might lead to the empowerment of the beneficiaries but could have undesired effects on the environment.

In the process of improving an appraisal technique such as agroecosystem analysis, or other

appraisal techniques, it appears worthwhile studying the feasibility of integrating the appraisal method with the monitoring and evaluation methods. As Hoare and Crouch (1988) have recognised, the participation of the beneficiaries in the monitoring process is usually essential to the success of the project. Involving the beneficiaries from the beginning of the appraisal process would make them familiar with the appraisal-monitoring procedure and would also enhance their understanding of the development problem. This is not to mean that the 'developer' has to teach the 'underdeveloped': a mutual learning process is involved in every development project and a two-way dialogue will obviously improve each party's understanding of the problems faced.

5. Sustainable Development and Project Aid in the Pacific

Pacific countries share the characteristic of insularity, but there are major differences in their resource endowments (Fairbairn, 1988) to be dealt with when considering the role of project aid for them. Bertram (1986) points out that Cook Islands, Niue, Tokelau Tuvalu and Kiribati are living at standards beyond those which can be sustained by local resources. He argues that there is little scope for the development of productive activities and 'future stainability of above-subsistence living standards, and the prospects for future increases in those living standards, hinge upon the durability of existing and future sources of rent income' (Bertram, 1986 p. 810). If this analysis is correct there is little scope for project aid focusing on local production improvements (Cf. Tisdell, 1990, Ch. 10).

This approach implies that atoll countries will remain dependent on donor countries. Changes in the international situation leading to reduced foreign assistance could cause severe disruptions to local economies which are vulnerable to external shocks. Furthermore, continuing dependence on foreign countries might not be socially accepted in these countries as pointed out by Tabai (1987). For these microeconomies there are no easy alternatives, but a diversified approach to development combining fisheries, agriculture; cottage industries, tourism[8] and development of subsistence production might diminish their economic dependence on foreign countries.

Projects focusing on the development of local resources (such as the giant clam case study presented later on) at a village level can enhance not only economic development but also

[8] See Abeysinghe (1987) for some suggestions

maintain the social fabric and preserve what is left of traditional knowledge, an asset that could prove valuable in the case of a decrease in foreign assistance.

An alternative to project aid in atoll countries would be the establishment of a trust fund which could be invested overseas as in the case of Tuvalu and Kiribati. That is likely to yield higher returns than funds invested in local development projects. The rate of return is however a unidimensional measure that does not take account for employment and income distribution considerations, nor of issues relating to the natural environment and cultural factors. If there is unemployed or underemployed labour, the option of investing funds abroad and merely drawing the interest is unlikely to be very appealing to a LDC.

There might also be cases, and this applies to all LDCs, where the social rate of return would justify a project that is not profitable from a private standpoint because of the presence of externalities (de Janvry, 1989). In this context it would be legitimate to provide aid even if it shows a negative private rate of return. Environmental problems are widespread all over the Pacific (Dahl, 1984) and even if the larger Pacific countries such as Papua New Guinea and the Solomon Islands are better endowed with natural resources than atoll countries, natural resources exploitation is reaching its limits in some areas. Approximate estimates show that the limits to carrying capacity of Ontong Java atoll (Solomon Islands) will be reached by the mid-1990s (Bayliss-Smith, 1986); villagers in North Malaita (Solomon Islands) have put a halt to the expansion of cash cropping as food production has decreased and soil productivity has declined up to 50% (Frazer, 1987). It seems important to direct aid towards the primary sector to jointly address socio economic and environmental problems.

Australian official project aid[9] accounts for about 18.5% of total ODA.[10] On a Country Program basis, Australian aid to South Pacific countries is about 60% in the form of project aid, with a minimum of 21% for the Cook Islands and a maximum of 90% for Tuvalu. Papua New Guinea is a peculiar case; it receives 91% of the Country Program aid in the form of budget support.

In a recent discussion paper, AIDAB (1990b) put forward some principles that should underlie Australian aid in order to promote sustainable development. This represents a step forward in improving the quality of development assistance but more in-depth analysis of the

[9] This does not take into account project aid provided by NGOs or international organisations with Australian official funds.
[10] Figure derived from data reported in AIDAB (1990a).

problems faced is certainly necessary. For example, in relation to the forestry sector AIDAB (1990) requires projects to conform to guidelines such as those of the International Tropical Timber Organisation, without recognising that sustainable logging in natural tropical forests does not exist at the present time (see Poore, 1989; Keto et al., 1990). As far as project appraisal is concerned, it is only mentioned that the skills of AIDAB personnel in using CBA involving environmental impact will be enhanced, but nothing is said about how and if the participation of beneficiaries in the project cycle will be factored in decision-making.

Projects financed by AIDAB appear to be concentrated on infrastructures with a relatively small share of aid going to projects in the primary and health sectors (Table 3).

Table 3 - Estimated total cost of AIDAB Projects in implementation or completed as at 1989. (Number of projects in parenthesis)

Country	Infrastructure			SG	PRI	HEA	OTH
	PRI	OTH	TOT				
Cook Is.		100%	66% (2)	23% (1)			11% (1)
Fiji	44%	56%	44% (3)	7% (3)	38% (3)	8% (3)	3% (3)
Kiribati	-	100%	97% (3)	2.7% (1)			0.3% (2)
Niue	-	100%	73% (1)	17% (1)			10% (2)
PNG	-	100%	1.45% (2)	0.6% (1)	16% (7)	2.5% (2)	79.5% (22)
Solomon Is.	30%	70%	34% (3)	4.7% (1)	15.8% (1)	3% (1)	42.5% (5)
Tonga	15%	85%	42% (3)	7.5% (2)			50.5% (5)
Tuvalu	16%	84%	37.5% (8)	19% (1)	4.2% (1)		39.3% (7)
Vanuatu	7%	93%	69% (7)	3.5% (1)	12.3% (4)	0.4% (1)	14.8% (6)
W. Samoa	8%	91%	75% (4)		14.5% (1)		10.5% (4)

Legend: SF = small project finance
PRI = primary sector
HEA = health
OTH = other
TOT = total

Source: Estimated from data from AIDAB (1989).

As noted earlier, infrastructural projects tend to favour urban and wealthier people so increasing income inequalities. They also allow a large share of funds to leak back to the donor country and might have adverse impacts on the natural environment. To promote sustainable development the current allocation of development funds may have to be reconsidered. It might be noted however, as Remenyi (1988) points out, that the Australian Centre for International Agriculture Research (ACIAR) funds rural research projects carried out by Australian organisations in cooperation with institutions in developing countries. This favours the identification of research priorities by local institutions in recipient countries. The identification of research priorities by local organisations makes the output of research projects more likely to be relevant to the recipient country. Cooperation in the implementation of a research projects strengthens local research institutions, thus providing a stronger basis for self-reliant research and development.

6. ACIAR's Project on Giant Clam Culture - A Case Study

Giant clams are a traditional food in the South Pacific. They are not only fished and consumed but also kept in 'gardens' as reserve food to be used when weather conditions do not permit fishing. Also, fishermen appreciate them as a healthy 'take away' food when fishing far away from the village.

They are mainly fished for consumption purposes by the local people and also for a limited commercial exploitation. Taiwanese vessels have in the past fished in areas such as Solomon Islands and Fiji, both legally and illegally. Giant clams are now listed as a threatened species under CITES as a consequence of overfishing,

Biological research financed by ACIAR, by the Micronesian Mariculture Demonstration Centre (MMDC) and by the International Centre for Living Aquatic Resources Management (ICLARM) has made it possible to culture giant clams. This opens the way to restocking of depleted reefs for conservation reasons and to farming giant clams for commercial and subsistence purposes.

Giant clams thrive in clean tropical waters. Farming of them in the ocean nursery and ocean growout stage is not complicated (Tisdell et al., 1991) and clam farming is a relatively environmentally friendly form of mariculture (Lucas et al., 1988; Tisdell, 1991). This makes them a product that can help supporting the village economy, thus maintaining the traditional

way of life, and contribute to the diversification of exports of Pacific countries without having a negative impact on the natural environment.

At the village level, giant clams could be farmed both for subsistence and commercial purposes. The size of the market for cultured giant clams is not yet known. Pacific governments and development agencies might therefore have to choose between the development of large-scale farms or small-scale village farms. It is possible that the development of large-scale commercial farms could preclude the possibility of villages being able to culture giant clams not just for subsistence purposes but also with a commercial objective in mind. Increasing village-income could tend to reduce urbanisation. For Indonesia, Godoy and Feaw (1989) showed that young people tend to remain in the village if there are economic opportunities. The possibilities for village-based commercial clam culture might however, be limited by the isolated location of many villages in the Pacific.

From interviews conducted during June-October 1990 in the Lau archipelago (Fiji)[11], it was found that the villagers interviewed are interested in farming giant clams for subsistence consumption and possibly for commercial purposes. Giant clams have become scarce in the vicinity of the villages and some interviewees were keen to farm clams in order to replete the stocks. Some also expressed interest because clam culture could provide an extra source of income. Some were also concerned for 'the future generations' and felt that clam culture would increase their prospects of enjoying a traditional village life.

A range of social, economic and biological factors are likely to influence the success of giant clam farming (e.g. Firdausy and Tisdell, 1990; Fairbairn, 1990). Clam farming in Australia appears to be potentially economic (Tisdell et al., 1991) but it has yet to be adequately assessed for other countries. Because clam farming requires a few years before the first harvest, financial requirements in purchasing clam seeds to start farming could lead villagers into indebtedness. Integrating giant clam farming with seaweed culture would partially solve this problem. In fact, Firdausy and Tisdell (1991) show that seaweed farming can be highly remunerative, reporting an IRR of 153% for a model farm in Indonesia. However, seaweed farming is not yet practised in the villages in the Lau group visited, probably because of their distance from the markets.

[11] Undertaken by Veikila Vuki as a part of a joint research with Clem Tisdell and Luca Tacconi. We expect the report to be available in early 1991, published in the series 'Research Reports and Papers in the Economics of Giant Clam Mariculture', University of Queensland.

The survey in the Lau Group showed that women collect giant clams (intertidal species) on the reef flats, whereas men collect them (sub tidal species) in deeper waters. Time availability of the two sexes is likely to be one of the factors influencing the choice of the species to be farmed. Given that women usually work longer hours than men, intertidal farming could increase their burden. Species choice should be made by the villagers assisted by the experts; special attention should be given to intra-household relations and the reasons for the choice should be made explicit.

The group(s) that will farm have to be identified and targeted for extension work. It should not be assumed that the 'village community' will automatically take care of the project. This could lead to project failure as it has happened for many 'community forestry' projects (Cernea, 1990).

A tentative list of key variables influencing a clam farming project, classified according to Conway's agroecosystem properties, is given in Table 4.

Table 4 - Some variables influencing the outcome of (benefits from) a clam farming project in Pacific Islands

Productivity
Demand for clams (local and overseas)
Transport costs
Satisfaction of maintaining the traditional village life
Stability
Production mix (sea-weeds and clams)
Marketing
Sustainability
Ecologically sustainable
- closed breeding cycle
Economically sustainable
- expensive imports not needed
Growout technique simple
Reef tenureship arrangements
Species farmed (influence on women's role)
Indebtedness (investment to purchase clam seeds)
Village organisations
Extension assistance (e.g. control of predators or diseases)
Equitability
Availability of credit
Production arrangement:
- within village, e.g. traditional cooperation
- with eventual partner in joint venture

7. Concluding Comments

Project aid has an important role to play in the sustainable development of LDCs. If sustainability is taken to include not only sustainability of economic and the environmental systems but social and political ones as well, the conventional approach to project aid appears inadequate to promote sustainable development.

The task ahead is to identify the sectors that should be targeted for aid. This could for example call for a shift away from infrastructural projects towards rural-oriented projects taken account of environmental, social and economic concerns simultaneously. Sustainability also requires that a narrow sectoral approach should not be adopted; for example, the impact of agricultural projects on the forestry sector should be taken into account.

At the project level, the present emphasis on 'measuring' sustainability has somewhat obscured the issue of 'who' should design and appraise a project. If participation of beneficiaries in the project cycle is recognised as a necessary ingredient, research on project appraisal has to address the issues of 'how' and 'whether' the present evaluation methodologies can accommodate participation by beneficiaries.

Because the scale factor appears relevant for project success, it is perhaps the case that different rules, methods and procedures need to be adopted for projects of different scale. Furthermore, it seems desirable that the project cycle be adapted to the project, not the project to the cycle.

In conclusion, more aid should be provided for village-based rural projects in LDCs. Despite the fact that the majority of the population of LDCs tend to 1ive in rural areas, most official aid is not spent on rural projects. Therefore an urban-bias exists in aid disbursement. Top-down methods of selecting projects and providing support for them are likely to be ineffective. There is a danger that cost-benefit analysis (CBA) will be used in this way and applied in a mechanistic fashion ignoring distributional and sustainability factors. While modifications have been proposed to CBA to allow for such factors, these modifications have shortcomings some of which were mentioned above. Australian project aid to the Pacific is not principally directed to rural village-based projects, and methods used for project selection and appraisal might have to be improved. However, it should be noted that aid donors tend to be limited in these methods by the wishes of sovereign recipient governments e.g. foreign

donors may be restricted by domestic governments in their interaction with local people at the village level. On the other hand, it is pertinent to note that the type of research projects supported by ACIAR are designed to provide direct rural benefits even though most also provide indirect urban benefits by raising agricultural productivity and increasing food supplies. Most of ACIAR projects involve direct collaboration in between researchers in Australia and LDCs. This is so of the giant clam mariculture project. Village-based benefits are seen as an important potential payoff from this project.

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