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IRRIGATION MANAGEMENT AND CONFLICT RESOLUTION

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Introduction

Few issues are more prone to conflicts than those concerning water. Whether one is looking at water quality or quantity or looking at local, national or international issues, conflicts appear to be the norm, not the exception. Conflicts over water can range from minor intra-household disagreements to major violent confrontations between communities over the use of water for agricultural and industrial purposes. Conflict among resource users can lead to a loss of those very sources of income and food upon which people depend.

This paper explores the relationship between access to water resources and the emergence, management and resolution of conflicts. It focuses specifically on conflicts resulting from allocation and access to water for irrigation. The paper begins with a discussion of the characteristics of water resources that seem to lead to conflicts. It then sets forth a model for conflict management that can be applied to irrigation systems and sets a number of case studies within the model.

At the heart of this paper is a concern about the direction of much of the irrigation management research and interventions in developing countries supported by donors such as The U.S. Agency for International Development (USAID) and The World Bank. We argue that the study of conflicts as a set of behavioral issues has been virtually ignored among irrigation management professionals and that they have not viewed conflict as a phenomenon that needs to be managed itself. Instead, efforts have focused on managing water,

facilities and irrigators. We believe that conflicts need to be a focal point if donors and national governments as well as local communities are to realize the potential investments from irrigation investments.

Managing irrigation conflicts is important because of the key role irrigation plays in food security within many countries. Between 1950 and 1980, the total area of irrigated agriculture throughout the world increased three-fold. This contributed to a 50 to 60 percent increase in agricultural output of the developing countries between 1960 to 1980 (Ostrom 1992:1). If conflicts emerge, they can result in inefficiencies and lead to degradation of the very resource that is a source of food and income for the poor. Development is not merely the introduction of new technologies to maximize productivity of existing resources, it must also tackle the question of how these resources and their productivity are to be shared (Conway 1986).

Irrigation Conflicts

There are certain characteristics of different types of natural resources that can result in conflicts. Resources have spatial and temporal dimensions, can be exploited in different ways and have unique physical properties which affect the likelihood of their being managed adequately and of conflicts emerging.

Water - and more specifically, irrigation water - is a resource that is most often shared by a large number of users spread over a geographic area. The physical properties of water as

a fluid, not fixed, resource which can be used by multiple users lend themselves to common property arrangements rather than individualized ownership. Variability in quantity, quality and locational dispersement does not permit water to be individually owned and used easily.

Inequalities are built into water regimes because of the physical properties of water. Water is not evenly distributed across the landscape and some users are inevitably closer to the source than others, some users with easier access and some users with more sophisticated technology for harnessing it. When water is abundant and dispersed over a broad area and for multiple uses - such as hydropower, irrigation, domestic supply, etc, it is likely that users will have unequal access.

inequality inevitable

Levels of Conflict

As a shared resource highly subject to inequalities in access, conflicts in irrigation systems are virtually inevitable. They can occur at many different levels ranging from small intrahousehold disputes to major violent confrontations between multiple stakeholders.

Within a family or kin group, feuds over the rights to water have been known to endure for generations. Social institutions such as inheritance laws, customary tenure rules and local level institutions often mitigate against such disputes. However, the introduction of new irrigation technology may prevent those institutions from operating to diffuse tensions. Even in more

Sources of conflict

traditional systems, demographic and market pressures can, particularly in water-scarce situations, result in conflicts that can no longer be managed by traditional institutions.

At the household level, a study of the impact of an irrigated rice scheme in the Gambia (Dey 1981) shows how irrigation projects can actually initiate situations of inequalities over the access to resources and lead to potential conflicts or, at least, social tensions within the household. In 1966, irrigated rice farming was introduced to Mandinka farmers with donor assistance but was targeted to male farmers. The effects of this have been multiple. First, women's rice production did not benefit from the development program. Second, the irrigation project failed to utilize the women's expertise in rice production. Finally, the failure to involve women in rice development schemes has increased their economic dependence on men. Women have been effectively excluded from owning irrigated land and receiving the credits necessary for cultivating irrigated rice on their own account. Instead, they have been a cheap source of labor in the transplanting and weeding of the crop. Since the irrigation project developed new land, it has structurally marginalized women from the modern technology.

Larger groups, such as irrigation communities or factions within communities can also be the dividing lines over conflicts. Local means of resolving disputes may still function but often become more intractable as the number of claimants increases and the competing uses of water resources increase. Below, this paper describes in more depth some of the kinds of conflicts at this

level.

At more complex levels, conflicts can involve NGOs, national governments, international donors and private entrepreneurs. These levels can raise the most difficulties since conflicts tend to involve groups with a great deal of power, authority and financial stake.

Practices Leading to Conflicts

Headend water wastage, tailend deprivation, rent-seeking, corruption, theft, and inadequate maintenance due to free-riding are all both technical and social problems that often lead to conflict between resource users. Water wastage often occurs when large irrigation projects are built over time and those early irrigators at the head end of the system have more favorable access. As more farmers begin to participate in the irrigation scheme, demand exceeds supply and the conditions for resource scarcity is set. Ostrom (1992:62) points out that decades of conflict may result from early developments that roughly conform to this sequence.

This scenario folds neatly into the *doctrine of prior appropriation*, which reads that whoever first exploits a resource establishes a right to continue to do so (Chambers 1988:37). This is one of the causes of the widely observed phenomena, tailend deprivation. Tailend deprivation is characterized by receiving too little water, receiving water too late, or suffering from its unpredictable arrival.

Inequalities are often exacerbated by tailend deprivation. Tailenders deal with these high-risk production circumstances by planting less risky, less profitable crops and applying fewer inputs such as fertilizer. Consequently, yields and income are much lower on tail-end farms relative to those at the head-end where farmers grow more profitable crops using more inputs. Furthermore, an inferior access to government services, transport, information and relative political powerlessness can be observed at the tailend. Chambers claims (1988:24), "socially, this is far more serious than the more visible problem of waterlogging."

Conflicts do not only occur between headend and tailend farmers, they are frequent between the tailend users themselves as social tensions rise. Chambers (1988) cites a case in the Lower Bhavani system in Tamil Nadu, where disputes were nearly four times as common in the tail as in the head.

Irrigation management specialists have made considerable efforts to address the problem of tailend deprivation by designing physical systems for more equitable distribution. For example the Karjahi Irrigation System in Nepal is designed to rotate the initial watering point annually, watering the driests plots first.

Although better system design may allow conflicts to be forestalled, it may not be able to solve all the problems. Irrigators are known to steal water by building illegal outlets, by breaking padlocks, and by drawing off the water at night. Not only does the insecurity felt by farmers under these conditions lead to low-risk attitudes toward production and disincentives to operate

at full production capability, it also increases tensions between farmers and raises the likelihood of conflict.

Free-riding is also a source of conflict commonly witnessed in irrigation communities. It occurs when some farmers fail to contribute to maintenance and repairs, with the expectation that others will provide these services for all. When this happens the free-riders benefit from an increased supply of water without paying their share of the cost. In the end, however, all farmers suffer. Angered that they are paying more than their share, honest farmers join the league of free-riders and the irrigation system becomes a dysfunctional project with silted canals and broken gates.

Two other types of non-cooperative behavior prevalent in irrigation systems are rent seeking and corruption. Rent seeking can be defined by actively seeking to acquire a disproportionate advantage from profit-making activities. For example, on the Bhakra-Nangal irrigation project in rural India, landowners exploited lower-caste farmers by claiming two-thirds of the production on land leased to lower-caste farmers. This example demonstrates the way in which irrigation projects, if designed with little regard to equity issues, can foster conditions leading to conflict (Ostrom 1992:34).

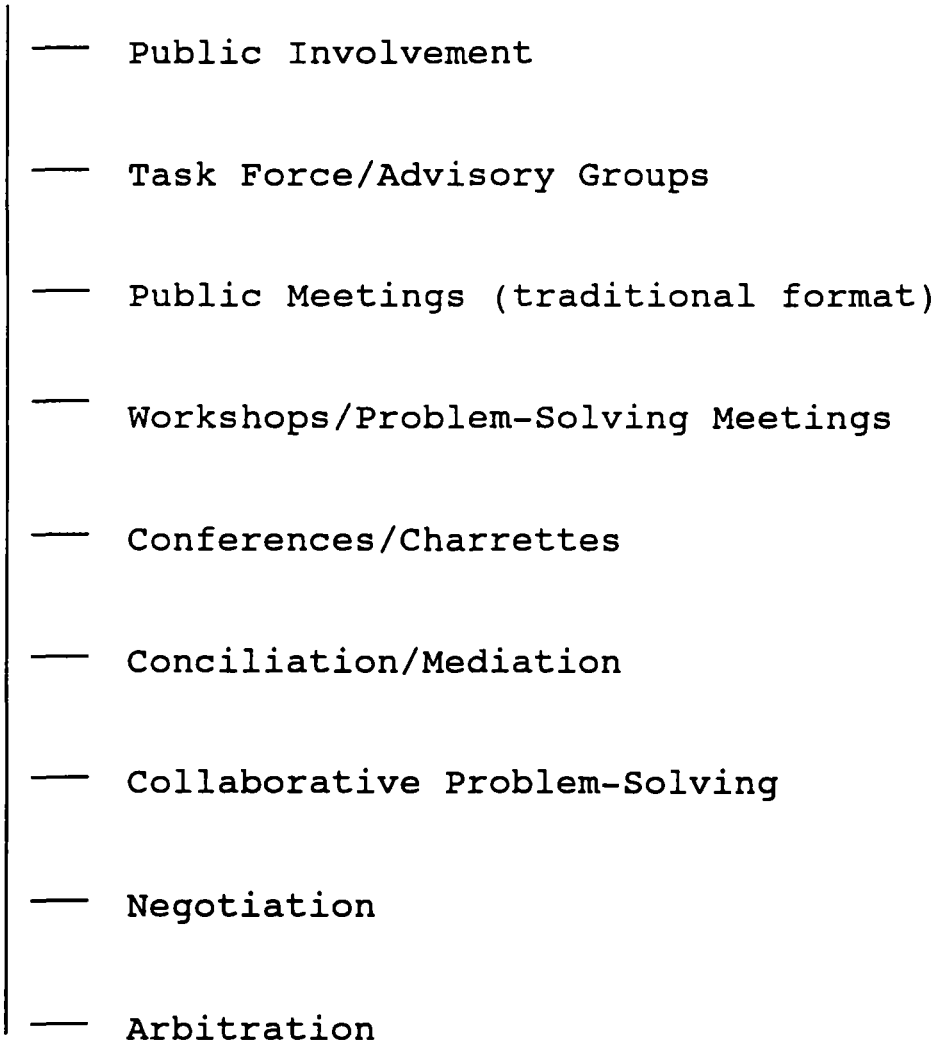
Public Involvement and Conflict Management Techniques

Frequently the major obstacles to solving the problems of water wastage, unequal distribution, theft and inadequate

maintenance are social, not technical. They are problems of reaching an agreement on facts, alternatives or solutions. There is a growing body of literature on how to reach agreement and build consensus. This literature on public involvement and conflict management techniques as well as alternative dispute resolution offers some important insights into the irrigation management problems cited above and their solutions.

An array of techniques for conflict management can be laid out on a continuum (see Delli Priscoli). At one end of the continuum are more traditional public involvement techniques, such as task forces, advisory groups and public meetings. At the other end of the continuum are negotiation and arbitration. These are techniques most associated with conflict management (see figure 1). While public involvement and conflict management tend to blend into one another, conflict management techniques more explicitly emphasize consensus building and power sharing. Public involvement focuses on information exchange and discussion. Both are strategies that seek to achieve a consensus among all parties on environmental and social objectives in water resource planning and management. As Fig. 1 shows, techniques of PI and CM can be viewed along a progression of having knowledge about a decision; being heard before the decision; having an influence on the decision; and, agreeing to the decision (Creighton 1985).

Fig.1 Public Involvement and Conflict Management Techniques[1]



[1] J. Creighton, (1985). *Managing Conflict in Public Involvement Settings*. Creighton & Creighton, Saratoga, California.

Public involvement

At one end of the continuum lies an array of public involvement techniques. Many efforts to improve irrigation management have focused on activities designed to improve public involvement by water users. Indeed, the last decade has witnessed a growing emphasis on social issues as those involved in the field of irrigation water management have come to realize that technical solutions alone will not solve problems of inefficiency and inequity. The result has been a strong push for farmer participation and efforts to form organized water user groups. The logic behind this is that if irrigators are involved, conflicts will be prevented, systems will operate more efficiently and agricultural production will increase.

Kirindi Oya: Public Involvement in the Irrigation Community. A prime example of the kinds of efforts that donors and the host country government put into public involvement is found in the Kirindi Oya irrigation scheme in Sri Lanka. Kirindi Oya (meaning "Kirindi River") lies in southern Hambantota District, approximately 260 km. from the capital city of Colombo. An initial project to use water from the Kirindi Oya for irrigation was completed in 1920 under British colonial rule.

Subsequent efforts have continued throughout the century and culminated in the most recent efforts during the 1980s to expand the irrigated area and settle new farmers under the Kirindi Oya Irrigation and Settlement Project (KOISP). These latest efforts

have been supported by external assistance from the Asian Development Bank. Approximately 8,000 ha of new land were opened up and an equal number of new settlers were brought in from poor coastal areas (see Stanbury 1989).

The Kirindi Oya Project lies in the Dry Zone, with a mean temperature of 26 degrees C and annual rainfall of less than 1,230 milimeters. Rainfall is seasonal and erratic so that rice cultivation is untenable without irrigation. Today the irrigation system services approximately 12,000 hectares of irrigated land.

Ostrom has synthesized much of the literature on Kirindi Oya predating the recent expansion in order to describe an example of institutional failures in common property systems. According to descriptions of the project, Kirindi Oya is a classic case of a system operating without adequate controls. Large landowners obtained special privileges related to water distribution through internal influence or by seeking external political intervention. Water thefts were common and rarely controlled. Unofficial channels were constructed to irrigate land. And those who irrigated at the tail end had highly unreliable supplies. Disputes among irrigators were sometimes resolved in a violent manner. In short, the water management system was characterized by inefficiencies, inequities and most of all, conflict.

Ostrom attributes the conflicts to the large number of farmers involved, the fact that they were poor and recent settlers with diverse ethnic and cultural backgrounds, a political system that allowed wealthier farmers to control water through illegal means

and the lack of physical control structures. She asks if they are doomed to eternal conflict and lack of cooperation and suggests that unless major changes are made in the local institutions, the answer is yes.

Under the most recent extension of the Kirindi Oya Project, the government with donor assistance has supported efforts to develop the local institutions by promoting more public involvement in managing the irrigation system. Efforts in KOISP were modeled on the farmer participation experience in Gal Oya, another irrigation project in Sri Lanka which underwent significant rehabilitation, supported by USAID. In KOISP, trained institutional organizers were appointed to groups of newly settled communities and were to act as catalysts in developing a democratic system of self-governance in irrigation matters. They were to help communities identify and appoint local water user representatives and form meetings of farmers.

Although the efforts to form farmer groups are recent and have not yet withstood the test of time, a key feature of KOISP is that public involvement was encouraged at the beginning of the project, rather than after conflicts had emerged. While problems were certain to emerge, this effort was a step in the right direction. If the earlier experience at Gal Oya offers any lessons, it is that public involvement by irrigators can result in fewer conflicts. The question remains, however, whether this is enough.

Conflict Management

On the bottom end of the continuum are conflict management techniques which emphasize consensus building and power sharing. By involving the parties in active participation, both PI and CM seek to increase the legitimacy of the final decisions. They are designed to reach a middle ground and move away from polarization and thus, increase the likelihood of implementation. Negotiation is the direct interaction among parties. It is often aided through mediation, where a neutral third party assists the negotiation process by taking an active role to identify areas of potential agreement and helping participants discuss the substance of their differences.

Alternative Dispute Resolution: A body of literature on alternative dispute resolution (ADR) has grown out of the Harvard Negotiations Project. The basic principle underlying ADR is interest based bargaining. It says that we need to achieve procedural, psychological and substantive satisfaction among parties of dispute. We achieve this by understanding there is a difference between process and content. Parties are encouraged to go behind their positions and to negotiate solutions around interests because lasting solutions depend on taking care of each other's interests. Delli Priscoli (1989: 33) notes that ADR seeks to "offload" adversarial legal systems.

The goal of ADR is to satisfy each parties underlying interests by inventing alternative actions. Win-win situations are created as opposed to zero-sum processes and outcomes. Success

depends on the discovery of a solution that at least meets the minimal needs of each involved party. Because of this positive sum approach, success cannot be success until their is unanimous agreement by all of the parties. One dissenter spells failure: the goal of reaching a mutually agreeable solution has not been achieved.

Organizations such as RESOLVE and the Keystone Center are increasingly focusing on natural resource conflicts in developing countries, using ADR techniques. In general, these organizations are engaging in mediation and negotiation activities. Their approach to conflict management is to allow the parties to meet face-to-face in an effort to reach a mutually acceptable resolution of the issues in dispute or potentially controversial situation. All approaches are voluntary processes that involve some form of consensus building, joint problem solving, or negotiation (Bingham 1984).

Much of the literature on ADR is designed to avoid litigation, administrative procedures, or arbitration. Bingham (1984) argues that in litigation the objective not to arrive at a consensus among the parties and is often appallingly ineffective in actually resolving the basic issues at stake in environmental disputes. Taking a legislative approach depends on effective lobbying which is restricted to organized interest groups with plenty of money. These methods of dispute settlement have substantial drawbacks in the United States: they may be totally unfeasible in less democratic societies.

Proponents of ADR argue that its effectiveness is based, in part, on its democratic nature.

> "Mediations' power to put an end to disputes lies not only in its ability to produce better substantive decisions, but also in the fact that its participatory and voluntary nature increases the legitimacy of those decisions and therefore increases the likelihood that they will not be challenged in the future" (Amy 1987).

For the negotiation to be successful, parties must have some incentive to negotiate with each other. In the case of irrigation disputes tailend farmers usually believe they will have access to more water: upstream farmers with already secure access to water, may believe the settlement could prevent an escalation of tension and conflict between differential resource users. Those parties who feel they will not benefit from the negotiation process or who feel they may even lose ground have the option of boycotting the round table discussions.

Both the measurement of success and the ability for the parties to agree upon and implement that agreement depends on how equitable both the process of negotiation and the outcome proved to be. It is impossible for all of the representatives at the round table to stand on equal footing. The complexity of environmental disputes and the interdependency of ecosystems presuppose a number of stakeholders and guarantee that power differentials will exist between those players. One problem of irrigation disputes is that

poorer farmers most likely do not have equal access to information needed to make a decision. One way to circumvent this problem is by pooling resources in order to engage in a joint fact-finding effort.

As equally important to smoothing out power differentials is including all stakeholders who have an interest in the outcome at the negotiating table. Attempting to simplify the communication by ignoring potential stakeholders is only counterproductive in the end. It is not clear whether the number of parties involved nor the presence of a deadline actually influence the success of the process. It is clear however that the implementation of the agreement can be seriously impeded by having conducted the negotiation process under conditions where not all of those to be affected by the outcome were present. Many local resource users have an interest and position with regard to resources but often are not formally organized. It is important that their lack of organization does not impede their being identified and invited to the round table. The participation of new identity groups will, in fact, enhance the creative potential of dialogue and options.

Stakeholder analysis is an ADR technique that can be used to identify all the parties that will be affected by a proposed project or program. The parties may be formal groups, such as a government ministry or NGOs or they may be informally constituted, such as a group of farmers. This analysis is based on the hypothesis that the failure of many environmental policies can be best explained by examining how interest groups use their

relationships with political leaders to exert control over the development process.

Stakeholder analysis provides a detailed road map of how the political system includes and excludes parties affected by development plans. The analyst should identify who the stakeholders are, their interests in the project, who represents their interests and how their interests are in conflict. By identifying the stakeholders, it becomes clear what parties have to take part in any agreements for institution building or environmental protection so that a binding commitment is obtained.

A word of caution is that this type of analysis can be difficult because of political sensitivities. Particularly when a case is extremely controversial and the political stakes are high, it may be difficult to obtain the information needed. The process of identifying stakeholders can be slow and often, it is better elicited through a neutral observer than through someone from within the country.

Once all of the parties have been identified and brought to the negotiating table, the possibility of achieving the goal will be further increased by having the players agree to: 1) the problem and, 2) the scope of the issues to be negotiated. Highly polarized or controversial issues usually require private conversations between the mediator and the parties individually to discuss what each parties' real concerns and goals are. Ideally, this will expand to an agreement on the issues and all assumptions about those issues. Finally the parties need to come to a consensus on

the solution.

One example of negotiation took place between Imperial Valley water users and the city of Los Angeles. Negotiations made it possible for stakeholders with sharply contrasting opinions to increase the options available for truly resolving these conflicts. The solution was a combination of creativity regarding technical solutions and realistic problem solving: Los Angeles agreed to pay for irrigation improvements that enhanced water conservation in exchange for rights to the water that was conserved. "Negotiated processes, when conducted well, can create benefits by focusing on interests (avoiding environmental harm, ensuring water supply for a metropolitan area) and by allowing participants opportunities to generate solutions" (Clark 1991).

Lake Buhi: Conflict Management in the Watershed. The case of Lake Buhi in the Philippines, offers a contrasting example to Karindi Oya. It begins with a heated dispute over the water resources of Lake Buhi in Bicol Province and is described in detail by Conway (1988). In addition to those farming irrigated rice fields, this dispute involved farmers who did not have access to irrigation water, the Philippine government, USAID and all the stakeholders of the watershed area.

The conflict that arose can be understood by looking at how the situation of water scarcity developed. The problem of water scarcity can be attributed to the increasing pressures on Lake Buhi's resources over time. In 1957, a hydroelectric plant opened

on the Tabao River below the lake. This, coupled with a 50 percent population increase in the agroecosystem since 1950, contributed to increasing pressures on the lake's resources.

Initial problems ensued for rice producers downstream who had more limited access to water. Upstream, the people who depended on the capture of the small sinarapan also suffered from the fishes inability to migrate upstream due to the obstruction of the powerplant.

In 1976, further tumult developed from the introduction of the Philippine government's Bicol River Basin Development Programme. This project, funded by the USAID, had the general goal of "improving the socio-economic situation and quality of life of the rural poor" in the area. More specifically it was designed to increase agricultural productivity and employment opportunities, reverse the deterioration of the upland watershed, and increase farmer participation in the development activities that effect them. This project included the construction of a hydraulic control structure at the outlet of the lake that would regulate the lake outflow by reducing the peaks and raising the troughs of the seasonal flows in order to provide a reliable supply of irrigation water to some 10,000 hectares of riceland. Also integrated into the plan was the channelization of the Tabao River outlet, along with its various irrigation works and the development of Irrigator's Associations in the service area. Additionally, a variety of soil conservation measures were planned for the watershed areas.

The project has been very successful in increasing irrigated rice production. By 1984, after half of the lower irrigation area had become operational, rice production had increased from 45 cavans (1 cavan = 25 kilograms) per hectare per year to 170 cavans per hectare per year (Conway). Nevertheless, several serious problems developed that would require long-term solutions. Fishing communities within the watershed were negatively affected by declines in productivity and stability of lake fishery production. The use of low water level capacities (below 83.5 m) resulted in the periodic drying up of fish cages, spawning grounds and the Buhi Freshwater Demonstration Fish Farm. Additionally, lower lake levels prohibited lake transport and contributed to health problems associated with domestic refuse exposed in the drawdown. During the times of the year when the control structure provided full water level capacity of the lake, periodic flooding of housing and cropped land took place. Even the deepening of the Tabao River led to the loss of fish cages in the river and East Channel and a loss of Tabao River transportation.

Angered by the serious threat the control structure posed to their livelihoods, those who relied on fishing operations on Lake Buhi confronted the government. By defending their rights to the lake's resources they pushed the government to form task forces within the National Power Development Program and the Bicol River Basin Development Program.

In reviewing possible approaches, A.I.D. suggested that agroecosystem analysis be conducted with an attempt to resolve the

growing conflict between resource users. Agroecosystem analysis includes initial data acquisition followed by a structured yet flexible workshop aimed at maximizing the participation of the various actors. The objective is to agree upon a set of prioritized key research questions and development plans that will lead to improvements in the productivity and the livelihoods of the people in a disputed area.

An agroecosystem can be defined as an ecological system modified by human beings to produce food, fiber or other products. The agroecosystem in this case study includes Lake Buhi, its watershed, the river below the lake and the surrounding land, along with the people whose livelihoods depend on the various productive potentials of the agroecosystem. These include farming as well as both fish cage and open-fish capture operations. The water in Lake Buhi is needed for the fishing operations, transport, electricity production, and rice irrigation. Conway clarifies the four primary system properties that characterize the interaction within each agroecosystem of the physical, ecological, and socioeconomic processes. These properties are: productivity, stability, sustainability, and equitability.

Data were collected by researchers who entered a village area without a pre-existing set of interview questions and objectives; through dialogue, they worked with local farmers and fishermen to design the research. By carrying out the initial interviews in this manner, researchers helped to set the stage for the workshop. Those with potentially less power already felt included in the

discussion.

Instead of being written into academic document form, the information gathered in the field is summarized in simple diagrams to be discussed in the workshop. By the use of maps, transects, seasonal calendars, decision trees, etc, four sub-systems were summarized: the watershed, the lake, the Tabao River channel, and the Lower Lalo irrigation service area. These diagrams illustrated four basic kinds of pattern - in space, in time, of flows, and of decision making. The diagrams were constructive in laying out the key structural, dynamic and interconnected features of the entire Lake Buhi agroecosystem and were invaluable to the participants ability to think of alternative solutions.

The workshop in Lake Buhi brought together over 60 participants including representatives of farmers and fishermen of the Buhi municipality, Philippine government employees from a wide-range of agencies, from USAID and the Asian development Bank. Simple diagrams are one way to level the playing field between these people with unequal access to information and its power. Often researchers and analysts lose people from outside their expertise in jargon specific to their narrow discipline. The diagrams offered improved, more insightful communication between participants from a wide variety of disciplines and backgrounds.

The dominant concern of the participants at the workshop was water allocation. According to the users and responsible government agencies, there was insufficient water to satisfy all user needs. Those who relied on fishing set the minimum lake level

at 82 meters in order that fish cages would not dry up, and transport in the lake would remain feasible. A total of 10,502 hectares in the wet and dry season needed to be irrigated. Additionally water would be required by the National Power Corporation to meet their goal of producing 10 megawatt hours per year electricity. Through creative problem-solving the participants reaced a consensus on scheduling the control structure around the critical fish-cage harvest months of April and May and consequently, the needs of the different parties were met.

Conclusions

The cases described above show some alternative mechanisms for managing conflicts. In the case of Kirindi Oya, the effort was on managing conflict indirectly - by encouraging farmers to become better organized. In Lake Buhi, the effort was more direct and the problem more immediate.

In Kirindi Oya, the emphasis placed on water user group development has been an important step towards prevent conflicts but it can only take the process so far. When one looks at problems within the larger watershed or between provinces or nation-states, participatory approaches may not be able to solve problems between different stakeholders. Workshops and negotiation such found in Lake Buhi, in which multiple stakeholders are brought together appear to be a needed next step.

There thus seems to be more to managing irrigation than managing water and people; managing conflicts through an array of

techniques may be needed. Too often conflict is seen as a symptom of a problem in managing irrigation water, irrigation facilities or, to a lesser extent, irrigators themselves. Indeed, it is critical if we are to realize the potential benefits from irrigation investments, and perhaps more important, if we are to address broader water resource management issues.

The range of public involvement and conflict management techniques have potentially much broader application to the management of natural resources globally. There appears to be a good deal that development agencies like A.I.D. and The World Bank can learn from those practicioners who are actively trying to come up with solutions to conflicts.

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