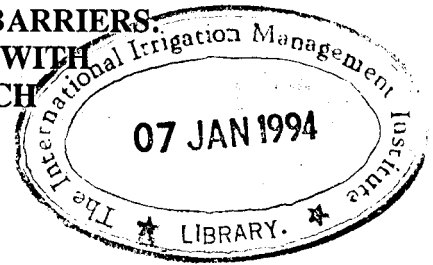


OVERCOMING ARTIFICIAL INSTITUTIONAL BARRIERS.
LINKING FARMING SYSTEMS RESEARCH WITH
IRRIGATION MANAGEMENT RESEARCH

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INTRODUCTION

The main thesis of this paper is that there is a serious gap between "normal" agricultural research (including Farming Systems Research -- FSR) and irrigation management research, as understood by the International Irrigation Management Institute (IIMI) and its partners. FSR and irrigation management research -- I shall call it IMR here -- share many characteristics, such as being interdisciplinary, field-based, client-oriented, and system-oriented. Nevertheless, the minimal linkages between the two research traditions is retarding progress in improving the performance of irrigated agriculture. The paper suggests an institutional explanation for this problem, and therefore proposes institutional solutions.

The next section elaborates on the thesis regarding the gap between FSR and IMR and its roots. Following this is a brief discussion of the institutional context of agricultural research in Sri Lanka, as an illustrative case of the general problem. The concluding section suggests some measures for overcoming the problem and developing a synergy between FSR and IMR.

In this paper FSR refers specifically to research on irrigated agriculture carried out by a variety of agriculturally-oriented researchers. Thus the term is narrow in its focus on irrigated agriculture, but broad in that it avoids discussion of the question of what FSR is and is not in a technical sense. What is meant by FSR and IMR is further explained in the next section. It will be clear that my perspective is from irrigation management research -- IMR -- since this is the tradition within which I work.

The analytical approach of the paper derives broadly from cultural anthropology. The major concept used in cultural anthropology is "culture;" this concept is differentiated from "social system" or what I refer to here as "organizations." **Culture** is used to refer to the set of values, beliefs, rules, perceptions, knowledge etc that is shared by a set of interacting people, through a constant learning process, and in terms of which people interpret and understand their own and others' behavior. Because of the learning and interaction, it changes over time: it is not a "determinant" of behavior, but simultaneously a facilitator and a barrier. I use the term "tradition" here as a subset of a culture (a "subculture"): a set of relatively integrated concepts, beliefs, ideas, etc that characterize a particular set of people.

Organization refers to the structure of roles in terms of which a group of people interact with each other and with persons outside their organization. These people obviously "share a culture" in terms of which they understand their organization, but the degree of sharing is problematic. An example of an organization is IIMI, or a department of agriculture. One more term that is often used rather loosely is "institution." I use the term **institution** as a complex of norms and behavior that persists over time by serving valued purposes. Thus an organization -- like an

irrigation department -- can be an institution, as can a legal system, or a long-standing system for distributing water like warabandi in Pakistan and North India, or indeed the Asian Farming Systems Network. The term institution thus comprises elements of both "organization" and "culture."

THE PROBLEM: TWO TRADITIONS, TWO CULTURES

There are presently two streams of research on irrigated agriculture, which are diverging in terms of their concepts and theory, methodologies, and position in regard to the key issues facing irrigated agriculture. These streams are 1) the long-standing traditional types of agricultural research, of which FSR is a component; and 2) irrigation management research, a more recent stream of research which had its origins in FSR but has increasingly diverged from its roots¹.

Farming Systems Research

I use FSR to refer broadly to what some call Farming Systems Research and Extension (FSR/E), or FSR/D (FSR and Development), or "research with a farming systems perspective", FSP (see Shaner et al. 1982; Stoop 1987; Jones and Wallace 1986). The main focus of this research tradition is at the farm level: the farmer himself (more recently, including herself), his or her fields, his or her crops. A number of problem areas associated with specific disciplines are characteristic: agronomy, soils, household economics, on-farm water management. FSR has provided a useful framework for integrating work on these issues into a whole farm perspective. In some cases, the FSR paradigm has enabled the inclusion of disciplines which address sociological issues, such as anthropology (Jones and Wallace 1986), but this is not generally as characteristic of FSR in Asia as in other regions.

The "institutional home" of this tradition of research (and more broadly, agricultural research) is within government departments of agriculture, agricultural universities, specialized agricultural research institutes, and international agricultural research centers (IARCs). The connection with departments of agriculture facilitates linkages with farmers through extension services. Where this research-extension linkage is present, an important result is that the first-level clients (extension specialists) and researchers potentially are closely linked². Extension staff know how to communicate research needs to researchers, and make use of research results; agricultural

¹. There is actually a third stream, or paradigm, focused specifically on irrigation technologies, associated particularly with civil engineers. The International Programme for Technology Research in Irrigation and Drainage (IPTRID) is promoting this work; and the International Congress on Irrigation and Drainage (ICID) provides an institutional framework internationally for this work. The lack of an effective research tradition in this stream is a serious impediment to progress in irrigation management, but not directly relevant to the audience for this paper.

². Use of the acronym "FSR/E" is intended to emphasize this important linkage of research and extension, although a recent evaluation found this linkage to be weak in most regions of the world including Southeast Asia (Frankenberger et al. 1989).

researchers know how to communicate their results to extension staff. The fact that the director of agriculture in some countries, such as Sri Lanka, often comes from the research side is an indicator of the status and importance of research, and researchers, within agriculture departments. And the research capacity of national agricultural research institutions (NARs) facilitates communication between them and IARCs.

Irrigation Management Research

Irrigation management research is a recent development which has its original roots in agricultural research, especially the FSR version. In its early stages it focused on on-farm water management and was thus an integral component of agricultural research. Although this on-farm water management tradition has continued within the agricultural research paradigm, a new paradigm has developed in part out of dissatisfaction with the results of on-farm water management research, and in part out of the increasing incorporation of new disciplines not part of the traditional agricultural disciplines.

The dissatisfaction arose as researchers came to recognize that on-farm water management problems are often a function of the way in which the "main system" component of irrigation systems is managed, and therefore cannot be solved at the farm level alone (Wade and Chambers [1980] is a seminal article in this regard). This dissatisfaction provided an opening for researchers from other disciplines to play an increasingly important role in irrigation management research. These disciplines include the social and management sciences. The issues addressed include operation and maintenance of all levels of irrigation systems, institutional, governance and organizational issues at the sector, macro-organizational and farmer levels, the environmental and sociological impacts of alternative ways of system management, and performance assessment methodologies.

Like FSR, IMR is multi-disciplinary, carried out in real irrigation systems (the equivalent of farmers' fields in FSR), is usually done in close collaboration with system managers and farmers, and is based on a systems perspective. Because irrigation systems -- or more broadly irrigated agricultural systems -- are complex systems, understanding them requires conceptual frameworks that transcend any particular discipline. Institutional and management issues have come to be seen as primary, leading to the increasing importance of social and management sciences in IMR. For a few years, the focus of IMR at IIMI and other places was rather exclusively on irrigation systems, conceived as water delivery systems with their associated institutional and organizational context. More recently, there has been a broadening of the focus of IMR to irrigated agricultural systems, including but not limited to irrigation management systems. This recent shift in the IMR paradigm is reflected in IIMI's first and second strategy papers (IIMI 1989 and 1992), and as discussed below, provides a basis for re-integration of IMR and FSR. Irrigation management is often thought of at IIMI and elsewhere as a new "discipline" emerging out of a synthesis of the contributions of several normal disciplines.

The institutional home of IMR is not the same as for FSR: aside from IIMI itself, there are a few universities and institutes working within this paradigm, but not many. More serious, there are

very few NARs doing IMR as conceived here. No Asian country has a national irrigation management research institute. This is surprising given the huge investments in irrigation over the past several decades, the high degree of dependence on irrigated agriculture for food security and economic well-being, and the wide consensus that irrigated agriculture is not performing at the level that had been expected.

The clients of IMR are also different from those of FSR. IIMI for example perceives its primary clients to be irrigation management agencies -- the civil engineering-dominated public works type departments that design, construct, and operate irrigation infrastructure -- and (more recently) the irrigation policy makers. These agencies are nearly always separate from agriculture departments in Asia, and are usually located in different ministries. Further, unlike agriculturalists, the irrigationists do not have a research tradition of their own, and have less capacity to identify research issues, do research on these issues or get such work done, and interpret and use the results. This problem is exacerbated by the fact that irrigation management agencies continue to be dominated by civil engineers (who are often more inclined toward construction than management, do not have a well-developed research tradition of their own, and often have little interest in agriculture), while irrigation management research is increasingly done by non-engineers. The gap in communication can be very wide³.

Obviously there are exceptions to this separation of the agriculture and irrigation management research traditions. There are clearly some overlaps. Some irrigation engineers have an interest and capability to do research and use research results; there is some communication and interaction between agriculturalists and irrigationists. But these linkages are weak, and are often notable precisely because they are exceptional.

The reasons for this separation deserve to be highlighted. I suggest two main causes. The first and most important is the institutional gap between agriculture and irrigation as exemplified by their being in separate departments and ministries. There are undoubtedly good historical reasons -- the past emphasis on construction of new systems made it logical to put irrigation into public works or land development ministries, and to have separate departments dominated by civil engineers. But increasingly this institutional separation is becoming a serious impediment to improving the performance of irrigated agricultural systems through adoption of research-based innovations.

The other reason for the differentiation relates to the divergence in the disciplinary mix of agricultural and irrigation research. While the FSR paradigm did enable agricultural research to accommodate researchers from social sciences in at least some instances, it also seems to have encapsulated these social scientists into a farm-level focus, with a special focus (for social sciences) on adapting technology to farmers' needs. This is important and useful work, but

³. See footnote number 1, above. My colleague Hammond Murray-Rust, in comments on an earlier draft of this paper, points out that while agricultural research recognizes uncertainty and therefore is more probabilistic and open to constant change, civil engineering is highly technocratic and deterministic in its orientation, which has led to a very slow rate of innovation.

university faculty suggest that the institutional barriers to cooperation between the Department and University do have an important impact⁵.

The Agrarian Research and Training Institute (ARTI) is also under the Ministry of Agriculture. ARTI is well known for past work on rural socio-economic problems, including irrigation management research. It does not do FSR. Its linkages with the Department of Agriculture are not as close as would be required for either organization to do IMR as defined in this paper: ARTI itself does not have the engineering and agricultural expertise, while the Department of Agriculture does not have the non-economic social science or engineering expertise required. The potential synergy between these two organizations is far greater than the present reality.

Irrigation Management Research

The Sri Lankan irrigation management institutional scene is rather complex (Merrey 1991). In fact, the Department of Agrarian Services within the Ministry of Agriculture is responsible for all "minor" systems, defined as those commanding 80 hectares or less. These constitute roughly one third of the irrigated area. But this Department has no research role or capacity.

Major irrigation schemes until recently have been managed by the Irrigation Department, or by the Mahaweli Authority of Sri Lanka (MASL). More recently, some systems have been "devolved" to provincial councils, but this devolution is still incomplete, and by and large replicates the institutional gap between irrigation and agriculture. The Irrigation Department has traditionally had some capacity for research on hydraulic issues, such as design of structures. But it is dominated by civil engineers whose background and inclination is more toward design and construction of irrigation infrastructure. Only in the last decade has the Department begun to give greater attention to management issues, and to get its staff trained in the technical aspects of irrigation management.

On about 44 major irrigation systems, the Irrigation Department shares responsibility with the Irrigation Management Division (IMD) of the Ministry. IMD was created to promote "integrated management" of schemes, i.e., better coordination between the water and agriculture sides, and to develop a joint management system based on farmer organizations. Although it has had some success, its project managers continue to complain that their lack of authority over officials from other departments inhibits their success. "Participatory management" of irrigation schemes is now the official policy of the Government, which has been further elaborated through a two-year policy support activity called IMPSA (see Merrey, de Silva and Sakthivadivel 1992). But this activity brought out clearly the differences in "culture" between the irrigation and agriculture ministries, as the two ministries were unable to agree on several important issues.

In the management of irrigation schemes, IIMI has clearly documented the inadequate integration of agriculture and irrigation agencies. A new system, Kirindi Oya, has been unable to achieve

⁵. Only one person from the University, the Dean of the Faculty of Agriculture, is included in the list of participants in the 1986 farming systems workshop (Ministry of Agricultural Development and Research 1986).

its objectives in large part because of this lack of integration (IIMI 1990). The MASL was originally set up to overcome this division, and to make integrated management a reality on systems it manages. There is no doubt that MASL has had some important successes, but even here, one finds not only a lack of integration but sometimes a high degree of competition between the agriculture and irrigation divisions in one MASL-managed system (IIMI 1990).

More important for this paper, neither the Irrigation Department nor MASL have strong research traditions; and their capacity to identify research issues, or make use of research results, is limited. This is in strong contrast with the Department of Agriculture's tradition, and limits the ability of the Irrigation Department to develop and adopt innovations. IIMI has a very strong presence in Sri Lanka, filling an institutional gap in IMR: its main partners have continued to be the irrigation management agencies (who have no research tradition, and little expertise in social and management sciences), supplemented by consultancy firms and others. There is presently no national institution with a clear mandate and strong capacity for irrigation management research.

CONCLUSION

This paper has argued that there is a large gap between agricultural and irrigation management research traditions, that this gap has been increasing, and that it is inhibiting the capacity of countries to improve the performance of irrigated agriculture. Even the FSR tradition of agricultural research, including work focused on irrigated agriculture, though it has some characteristics in common with IMR, is diverging from IMR. The paper attributes this gap to the fragmented institutional framework within which irrigated agricultural research and management are implemented: while agricultural research is done by ministries and departments of agriculture, irrigation management research, to the extent it exists at all, is within ministries of public works, water resources, or land development. The divergence is exacerbated by the inclusion within IMR of social and management science disciplines not found in FSR. Because the divergence in research traditions has institutional roots, the solutions must also involve institutional changes.

One important shift has occurred at IIMI, which provides a window to facilitate re-establishing linkages: because IIMI has changed its focus from irrigation system management to irrigated agriculture, there is now a clear conceptual basis for cooperation with agricultural researchers. This will in fact be very necessary as IIMI itself has only a little expertise in traditional agricultural disciplines: in future, IIMI will seek to collaborate more closely with other IARCs and NARs than it has in the past.

On the agricultural side, FSR (including, here, on-farm water management research) provides a conceptual basis for this linkage with IMR⁶. This is because of its inter-disciplinary systems-oriented and holistic approach. IMR has its roots in FSR to a considerable degree, so that there is a basis for common understandings. This shared understanding is potentially enhanced by the shift in focus of IMR from irrigation systems to irrigated agriculture. But a broadening of FSR may be required, to integrate institutional issues more directly into the paradigm.

Internationally, the recent entry of IIMI and other natural resource-oriented research centers into the CGIAR system will facilitate a convergence of the IMR and FSR traditions. At the national level, I suggest four options for improving the FSR-IMR linkages in Asian countries. These are not mutually exclusive; one, several or all of them could be considered. All of them are presently being discussed, or implemented, in one or more places.

The first option is to build on the strong agricultural research tradition found in Asian countries and broaden it to include IMR. Some countries have adapted their research strategies to include a central focus on FSR, and to make their research more client-focused⁷. Broadening further to include IMR would involve addressing new issues above the farm or tertiary level, and would require changing the disciplinary mix to include social and management sciences. This approach would require the agriculture ministries to take the initiative.

The second option is to develop an enhanced research capacity in the irrigation management agencies, and to ensure this capacity encompasses both agricultural and irrigation management issues. Some countries have been experimenting with ways of doing this, including India, Philippines, and more recently, Sri Lanka. In India, most state irrigation agencies now have water and land management institutes (WALMIs) with a primary mandate for providing training in irrigation management to irrigation staff, but a supporting mandate for research. WALMIs usually include both irrigation and agricultural specialists. Unfortunately, while WALMIs seem to be playing an important role in training of irrigation staff, their research capacity is weak, and is likely to remain so.

The National Irrigation Administration (NIA) of the Philippines actively engages in collaborative action research with research organizations and universities, including a recent project with IIMI assistance. This work has tended to focus on organizational issues; while NIA does get involved in agricultural extension, it does not do research on agricultural issues.

More recently, with IIMI's collaboration, the Sri Lanka Department of Irrigation has formed an Irrigation Research Management Unit, through which it hopes to build a capacity to identify

⁶. Bawden (1992) proposes a concept he calls "Systemic Action Research" (SAR) as a conceptual basis for addressing the "fragmentation" characteristic of agricultural research; this concept is similar to that underlying recent IMR work at IIMI, and provides a useful basis for integration of FSR and IMR.

⁷. For example Indonesia; see McArthur and Rerkasem (1989). A recent workshop in India suggests promising developments in that country as well; see Raman and Balaguru (1992).

research needs, get it done, and make use of it. The proposed research topics cover both agricultural and irrigation management aspects.

A third option which has been considered in several larger Asian countries but never implemented is the establishment of a national irrigation management institute (NIMI) of some type. Such an institute could play a significant role in building the capacity for IMR and for integrating IMR and FSR research. It is surprising that despite the huge amount of funds spent on irrigation development, none of the countries that have considered this option have yet been able to fund and implement it.

Finally, countries can reconsider the separation of irrigation and agriculture at ministerial level. Now that the era of major construction is completed, and irrigation organizations are being encouraged, or forced, to become irrigation management agencies, the integration of these two into a single ministry could be an important reform. It would then be possible to manage the irrigated agriculture sector in a more integrated and unified manner. The two research traditions could also be more easily integrated in such a setup. Discussion of this option is currently underway in Philippines, though not for the reasons suggested here.

To conclude, this paper calls for re-establishing active linkages between agricultural and irrigation management research, with farming systems research on the agricultural side providing the impetus for establishing these linkages. Irrigated agriculture constitutes a complex system. Neither tradition by itself can succeed in improving its long term performance and sustainability. Researchers in both traditions need to reach out to each other, and encourage the necessary institutional changes for success.

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