

SOCIO-ECONOMIC RESEARCH AND DEVELOPMENT FOR IRRIGATION COMMUNITIES

**The socio-economic research needs of irrigation
communities in making structural changes in the next
30 years**

March 2002

Capital Agricultural Consultants Pty Ltd, Canberra, ACT



**National Program for
Irrigation Research and Development**

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Onko Kingma
Noel Beynon

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Executive summary

The case for maintenance of a healthy environment that supports sustainable economic activity and offers economic, social and environmental benefits, has been well argued. All stakeholders, whether farmers, governments, non-government organisations or industry in all its forms, have a crucial role in this process, as decisions and actions of stakeholders at all levels greatly affect outcomes from use of water and other natural resources.

In many catchments, new approaches to the use and management of water and other natural resources will be required, if we are to achieve personal and national economic, environmental and social goals. The issues are complex and will not be able to be handled in isolation. A sharper consumer focus on environmental performance in production and on food quality and safety, is now evident. The linkages within and between natural systems and the inter play of economic, social and biophysical factors that influence natural resource decision making, will require a more coordinated and integrated approach to the issues.

These are all socio-economic issues – how the structure of, and linkages between, economic and social enterprise, and ways in which individuals and groups consult, communicate and interact in the conduct of economic and social activity, impact upon our water and other natural resources.

Presently, our knowledge about these socio-economic issues lags well behind our technical knowledge. Yet net benefits from changes in economic and social structures and relationships are possibly as great as those from technical breakthroughs.

A program of socio-economic research for irrigation communities will, therefore, equip us with the insights and tools to shift towards more sustainable production systems and water use and management regimes.

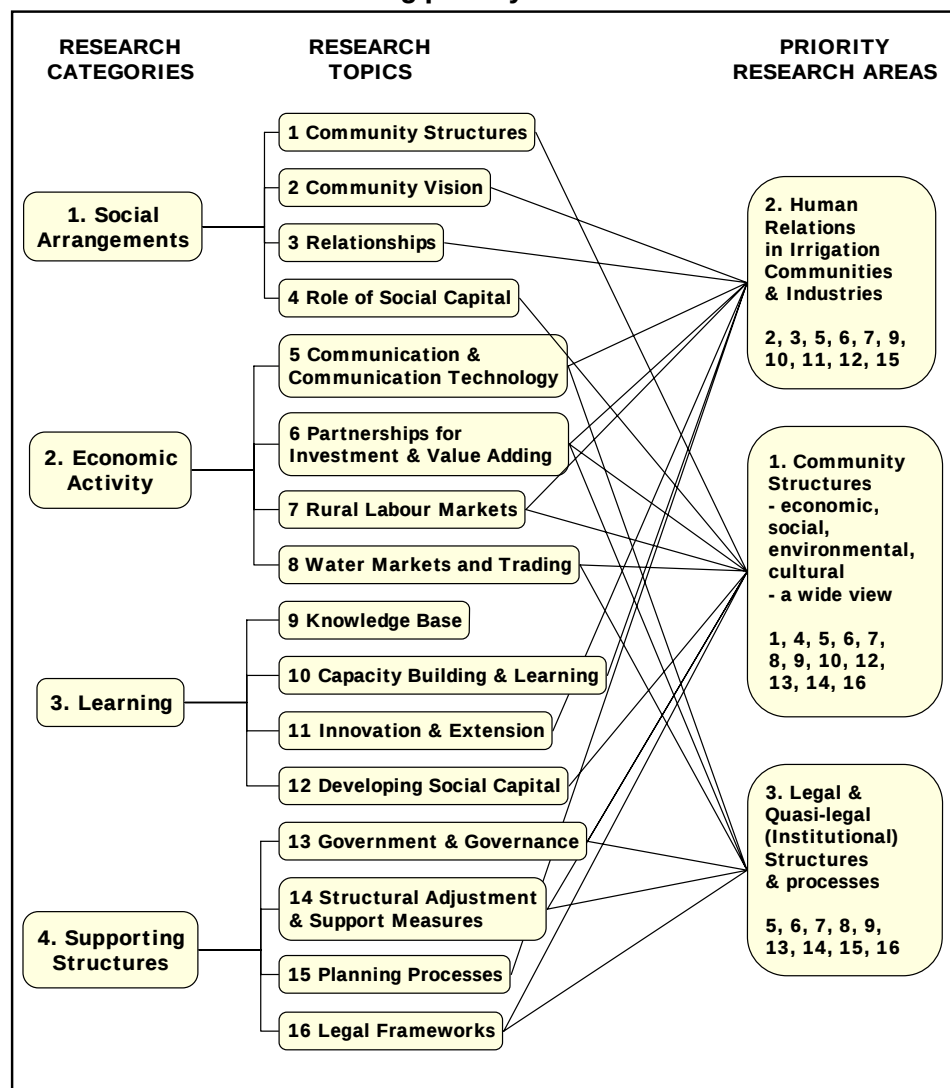
Identification of socio-economic research topics

This report has identified 16 inter-related ‘research topic areas’ for socio-economic research, development and extension (R,D&E), for consideration by the National Program for Irrigation Research and Development (NPIRD) of Land and Water Australia. The topics are summarised in Figure 1. The priorities among the topics, shown in Figure 1, are discussed later in this summary. Note that 15 of the research topic areas are linked to the three priority research areas but as development of a sound and updated knowledge base underpins all of the socio-economic research areas no lines of linkage have been shown between research topic 6 (knowledge base) and the priority research areas.

Research topics range across a number of disciplines, given the need for more holistic approaches to the present problems and issues in irrigation areas. Research results will be required in these areas if communities are to make the successful transition to more sustainable irrigation communities under the revised water and human landscapes for 2030, discussed in Section 4.2 of the Report.

A research program of this nature is complicated by the different technical, informational, structural adjustment and innovation needs of different producer, industry and community groups. Irrigation communities are not easily defined. Thus blanket recommendations and broad strategies for change across these various groups may fail to attract the appropriate community responses. Part of the charter of a socio-economic research program should therefore be to uncover the factors and complexities that facilitate motivation and learning in complex and diverse communities, such as we have in irrigation areas.

Figure 1. Framework for establishing priority research areas



The sixteen research topic areas

The topic areas where socio-economic research projects are likely to have a high pay-off are outlined below. The focus is essentially on irrigation communities. However, it is recognised these communities operate within a wider regional, national and international community framework and that this wider framework and linkages must also be considered in socio-economic analysis. Sixteen research topics for a socio-economic research program for irrigation communities are suggested

below and prioritised. Research topics have been structured into the following four categories.

- **Social arrangements** – covering values, institutions and the debate on the structure of irrigation communities.
- **Economic activity** – covering the issues relating to farming enterprises, business structures, development of markets for inputs and products, and the scale and scope of industries supporting agriculture.
- **Learning** – covering issues relating to innovation, capacity building and the development and uptake of knowledge.
- **Supporting structures** – covering issues relating to governance, structural adjustment, planning processes, operational arrangements, and support measures.

Research is already available in many of the 16 topic areas below and this research should be recognised. Any projects taken from these topics should therefore, take the approach of reviewing relevant research in the area and utilising available research results in developing models and analyses.

Research Category 1 - Social arrangements

This area is about the socio-economic structure of and linkages in, local and regional communities in our irrigation areas. Sound information is central to good decision making and risk management. Knowledge about these communities, and the characteristics of stakeholders, industries and other groups, provides a powerful means of changing the ways in which we use and manage our water and other natural resources. Socio-economic research into the structure of irrigation communities is therefore likely to have a high payoff. This also requires research into community values, the structure of relationships, the role of social conventions in shaping attitudes and the factors determining change and decision making.

Topic Area 1 - *Community Structures*

Research into the structure of industries and local and regional economies, from the viewpoint of environmental, economic, social and cultural sustainability.

Understanding of the dynamics of the institutional, economic, social and cultural environment within which irrigation communities operate should underpin plans and policy development. Information on the structure of the environment we live in and the processes of and mechanisms for change, is essential for visioning and decision making. We have little knowledge of how structural change may help or hinder regional growth prospects and help to resolve equity issues. Practical strategies are required to enable communities and regions to attain their economic and social potential, based on detailed analysis of current performance and prospects. New work will be required to analyse the dynamics of change, the data requirements for wider analysis of community structures and steps communities should take better to understand their own localities.

Topic Area 2 - *Community Vision*

Research to identify the needs and aspirations of communities, gain community participation in change and develop improved models for consultation

There is presently the possibility of a fundamental re-think of values and innovative approaches to policy development, to bring into play new institutions and ways to re-enfranchise irrigation areas. Communities are beginning to seek ways to grapple with the challenges facing them. In many cases this requires that they take charge of their own destiny, develop visions for their future and implement local solutions. Research is required in this area and particularly, into the visions and aspirations of irrigation communities and regions, and ways in which different cultures can come closer together.

Topic Area 3 - Relationships

Research into the structure of relationships, pathways and networks best suited to effective community processes, working in teams and groups, and 'getting to agreement'.

A key factor influencing behaviour, attitudes and the ability to resolve and avoid conflict in the use and management of natural resources, is the relationships and inter-relationships which stakeholders have with each other and the wider community.

An increase in focus is required on the human element, skills and relationships as a basis for the partnerships for investment and natural resource management. Habits and identity are tied up in traditional behaviours and it is the perceptions and conventions involved, which must be addressed if adoption rates for irrigation practices are to be altered. Of relevance are the essential characteristics or make up of participants and the factors at the farm, catchment, industry and regional levels, which influence these.

A central focus is to find ways to help farmers, extension workers and other participants think beyond the boundaries of individual properties and interface with other farmers and those who have responsibilities for water resources. This is also important for those who influence behaviour, such as catchment authorities, local government, input suppliers, purchasing companies, state governments, and so on. The willingness and ability of various stakeholder groups to respond within this wider social setting is an important area for research and policy development.

Topic Area 4 - The Role of Social Capital

Research into the role of social capital in facilitating (or hampering) community progress.

The role of communities is increasing in importance in the management of water and other natural resources. Communities are held together by social capital, which is the networks, norms, trust and bonding, bridging and linking ties involved in working together. Social capital is embedded in the relationships between people and created by families, communities and regions and the nation as a whole for the benefit of all members. The capacity to motivate and activate our knowledge, and physical and human resources is dependent upon the stock of positive social capital. Little is known about what influences the growth of positive or negative social capital, as a determinant of the capacity of communities to manage their resource base and the structural changes which accompany growth.

Research into social capital should take account of the diverse nature of stakeholder groups in irrigation communities and, in particular, the factors which draw response

from and motivate different producer, industry and community groups. This is an important challenge for socio-economic research.

Research Category 2 - Economic activity

The structure of economic activity and the technological and management processes we use to produce goods and services, whether through the public or private sector, have a marked influence on our water and other natural resources. This area is, therefore, about the commercial and market operations involved in the use of water and other natural resources, and the impact of the associated technical, financial, managerial and risk management practices in both public and private enterprise, on the sustainability of this socio-economic activity.

Topic Area 5 - *Communication and Communication Technology*

Research into improved models for communication with stakeholders including appropriate information and communication technology.

Issues of consultation and communication with and between stakeholders are presently among the most urgent and unresolved issues in rural policy in Australia. Issues are the availability of quality information, effective communications technology and the ability to use the information and associated technology. Administrative structures and information management systems should facilitate synthesis of information and knowledge, management of risk and uncertainty, adoption of learning processes and effective decision making. In many instances these are poorly developed or in their infancy.

Associated with this is the development and use of decision support systems and information technologies for not only data management and analysis but also as tools to assist communication, negotiation and decision making. Addressing the issues will require new ways of engaging individuals and groups, of communicating between stakeholders and of skilling of people and groups for effective uptake and use of information and information technology.

To date rural and regional Australia has been disadvantaged in terms of access to quality telecommunications infrastructure, particularly, the capacity to access effective internet services, such as , text, images, sound, software and video. Bandwidth at minimum standards for speed and quality are not available in many rural areas and there is presently a growing divide between urban and some rural areas. It is expected that, by 2005, all areas in Australia will have access to bandwidth of a minimum standard. This will be commercially delivered, heightening the problems of affordability, relative disadvantage between some regions and whether service industries, such as banks, stock broking firms, agribusiness and supply chain ventures find it profitable to invest in irrigation areas.

All these issues in communications and access to associated technology, are important topics for socio-economic research.

Topic Area 6 - *Partnerships for Investment and Value Adding*

Research into the types of partnership, consortia and affiliation arrangements and networks required to achieve joint community, industry and government investment in irrigation communities.

High levels of risk and uncertainty in local investment are, largely, due to increasing complexity of the investment environment, the scale of investment required, externality issues associated with the uses of natural resources, and the structure and scale of industry and business. In many irrigation areas and regions, the quality and level of services, whether public or private, is continuing to decline.

Economic imperatives and issues of 'critical mass' determine amalgamation of services and in many cases closures. Often business closures stem from 'the tyranny of small decisions' where decisions by individuals operating in isolation lead to closures which could have been avoided with strong community leadership and networks.

Communities will want to develop businesses and services, which are local and different from the traditional models. However, despite efforts by some communities to make changes, there are still significant barriers to implementation of effective models. The only way forward, in many cases, is for irrigation communities to work in partnership to establish the conditions required to encourage strong local industries which value add their produce, and to facilitate formation of strong business linkages into their communities via relevant export industries and the agribusiness sector. This requires analysis of options and a sound research base.

A major driver for irrigation communities is accommodation of growth in the large scale input supply industries, service companies and other areas of agribusiness. Irrigation communities will have to keep pace with these developments. The impact of these developments on communities is not well researched. Investment in these areas will involve all levels of government and associated agencies in partnership with industry and the community.

These issues will require extensive research to identify best practice, appropriate partnership arrangements and feasible models for investment, to meet the needs of different producer, industry and community groups.

Topic Area 7 - Rural Labour Markets

Research into rural and regional labour markets and identification of policies to overcome employment problems particular to rural and remote communities.

Issues in rural labour markets are associated with availability of a skilled, flexible work force, employment prospects and provision of physical and social infrastructure to facilitate development of a learning culture. Farming communities are clearly coming under increasing pressures to upgrade or formalise skills to ensure best practice and long term business viability, and to have recognised qualifications to satisfy business needs. There is increased awareness of the benefits of and need for investment in training, in part, driven by business management imperatives and new income and business taxation policies.

Indications are that agriculture, particularly businesses associated with irrigated agriculture, have sound prospects and there is a strong demand for skilled, high quality and flexible labour. However, there is a need for marketing and promotion of these issues and of education, training and learning opportunities.

There are significant barriers to the uptake of education and training, and skills shortages and gaps (eg. management, business planning, technology uptake, labour

market shortages etc) which should be addressed in policy and service provision terms, and from the viewpoint of the client base. These are important research areas. Statistics continue to point to rural disadvantage in education and training and employment generally. Labour markets in agriculture are segmented (owners, workers, age, gender, etc), and there is significant variation between, and overlapping skill and labour difficulties across, sectors and industries. Some rural areas are locked into a 'low skills – low quality cycle', paying insufficient attention to the need for high-level intermediate skills in export-exposed sectors of industry. Age and skill profiles indicate a looming skills shortage and an ongoing need for positive policies for replacement and improvement of the skills base and succession planning.

These are all, clearly, significant issues for socio-economic research.

Topic Area 8 - Markets and Trading

Research into measures and models for appropriate functioning of markets and trading arrangements for water, and environmental services associated with water and other, associated natural resources.

Economic instruments such as markets have the potential to transfer information, allow decentralised decision making, contribute to efficient allocation of resources and minimise administrative costs. However, these instruments can also have limitations in terms of identifying and valuing environmental and wider benefits and costs of water and other resource use. Implications are that water and other natural resources may be used in excess or not utilised effectively, with repercussions for communities. Second and third round effects of changes in the use of water and trading may also have repercussions for irrigation communities.

Research should aim to develop, in partnership with appropriate agencies and community groups, efficient technical and economic market arrangements for the trading and allocation of water, and environmental services for associated natural resources, where appropriate. This will involve attitudinal, behavioural, equity and duty of care issues, which require socio-economic research. Where such markets are not appropriate, new governance processes will have to be set in place for the allocation and use of environmental resources, and for resolution of resource conflicts. The social and distributive effects of the introduction of markets and their rules and operations require new research attention

Research Category 3 - Learning

Communities thrive where individuals, groups, organisations and community groups have the capacity to learn and innovate in the light of experience. A learning culture, in turn, relies upon sound social relationships and communications, and institutions, which foster participation and facilitate change. These institutions will encourage growth and sharing of knowledge, capacity building and the development of networks and pathways to maximise opportunities and wealth.

Topic Area 9 - Knowledge Base

Research to determine the requirements of a knowledge base appropriate to meet the irrigation community challenges and aspirations.

Underlying community stakeholder processes is a requirement for better understanding of the economic, environmental and social and cultural forces, processes and systems in regional communities and at all levels from local to

national. The use of sound information and analysis by all stakeholders for awareness, vision building, planning, investment decision making and benchmarking, increases understanding of these issues.

Much has been done to development of more detailed and sophisticated environmental, economic and social data and information systems, which, combined with information technology, has already increased the capacity of communities and industry to understand and better manage their impacts on the natural resource base.

Despite this, it is well recognised there is a need to improve the regional and local statistical collection. Current statistics offer too narrow a vision for changes occurring in regional communities and for solution of many contemporary problems. Small area data become increasingly important with emphasis on distribution, equity and disparity in regions. Similarly, small area data can affect business investment decisions to locate industry and new enterprises. Governments could help resource data collection and analysis of Australia's regions, conduct research on knowledge bases, develop and demonstrate innovative strategies for sustainable regional development and play a part in provision of information and knowledge to stakeholders at all levels. More socio-economic research is required in these areas.

Topic Area 10 - *Capacity Building and Learning*

Research into approaches to and frameworks and applied models for capacity building and lifelong education and training in irrigation and regional communities.

Achieving behaviour change in farming and business has become complex, requiring knowledge of the many factors and forces influencing business managers. In addition to adoption of new production technologies, farmers must now give more attention to investment in: human skills and education; the uptake, analysis and use of information; the management of risk; the production, quality and marketing of their products; the financial and personal management skills of the management team; and the institutional organisation and structure of their industry. This will require shifts in the attitudes and perceptions of many farmers and their support workers and organisations and a new willingness to enter into cooperative dialogue and networking with their communities and groups of common interest.

Achieving a balance between all these areas will be important, requiring continuing access to, or willingness to participate in, education and training. These systems must meet the special needs of different groups of farmers, people in industry and community groups, including indigenous communities, with respect to isolation, face-to-face delivery, communication, case management, planning, lifelong learning and career development. This requires new approaches to the adoption of new technologies and management systems, skilling and re-skilling, and ways in which relationships are managed.

Socio-economic research is required into not only farm level factors but also wider off-farm economic and social factors, bonds and ties to wider circles of individuals and groups, influencing behaviour to improve natural resource management and create a learning culture.

Topic Area 11 - *Innovation and Extension*

Research into new approaches to innovation, extension, and the uptake and use of technologies, management systems and knowledge, to create a culture of learning organisations, industries and communities.

Research shows that for innovation, and adoption of new and adapted technologies, regional businesses and communities must become learning businesses and communities based on knowledge intensive firms operating through continuous improvement and regeneration of organisational structures, networks and linkages. Commercial activity should be supported by networked, informed, and skilled local communities. There should be enabling leadership within the community as a basis for structuring partnerships and resolving conflict.

Facilitating the uptake of technology and new management systems is an integral part of this. Successful industries have strong linkages, such as to buyers, suppliers, customers, technology and networks, and these linkages work best where industries are geographically concentrated or clustered. Firms and industries are best able to achieve external economies through participation and partnership at all levels.

The degree to which business enterprises can become embedded within regions, however, is related to the scale of enterprise and size of firms. The dilemma is that as firms capture economies and become larger they also become less effective in helping to build social cohesion and unity. Regions need to attract skilled workers and high technology firms and have the mechanisms in place to retain them and encourage learning in the local economy. In turn, regional communities must be able to provide the environment not only to attract knowledge but also to retain and embed this into local economies. Factors such as these contribute to more effective and efficient business structures, and private sector investment, innovation and risk sharing. Requirements for innovation and extension will vary across producer groups, farming structures (eg small farm versus corporate farming), industries and community groups.

The innovation system is also important. Aside from the public R&D and extension effort, there has been relatively limited R&D. Public R,D&E has invariably been technically oriented, to the detriment of organisational and managerial innovation and R&D into information technology, supply chains and value adding. The interface between technical R&D and the uptake of technical R&D results has received relatively little attention.

New innovation systems should be designed to produce a diversity of evolutionary and revolutionary innovations, remove constraints and respond to the innovation and extension needs of the range of farmer, industry and community groups. This R,D&E should be supported by pooled resources from all these groups. Mechanisms for this are not well developed.

Socio-economic research into ways to influence all these factors at the community level will have a high commercial and social payoff.

Topic Area 12 - *Developing Social Capital*

Research into the development of models and mechanisms to encourage and the growth of positive social capital in irrigation communities.

Communities can best develop and enhance their capacity to determine their own futures through strategies for empowerment, community planning, innovation and leadership. Research shows empowered, learning organisations and communities, which build on their social capital, will be most effective in achieving successful change. Social capital is not only an important means for bringing about required change but it is also the product of such change. Growth of social capital is dependent upon institutional and policy settings. It is institutional settings within which markets work, which give expression to economic and social behaviour and within which communities develop their social structures. Issues such as these have been identified in other research and, in particular, the need for local leadership development, community capacity building and review of the roles of government, business and the community in achieving growth. However, further socio-economic research is required to develop the models and mechanisms to achieve on-ground results.

Research Category 4 - *Supporting Structures*

The mechanisms and processes to ensure the successful outcomes from economic and social activity are as important as the activities themselves. They concern governance, ways in which power is used, planning, communication, stakeholder processes and the various incentives and penalties to improve performance. These are all socioeconomic issues and concerned with implementation of the concepts and policies outlined in the first topic area, 'Social Arrangements'.

Topic Area 13 - *Government and Governance*

Research into the role of governments at all levels in helping to achieve sustainability, and more broadly, appropriate forms of governance and devolution of power, and models for achieving responsibility and duty of care for irrigation communities.

Governance is the structure of institutions within which groups operate including issues of autonomy, representation and ownership, and the nature of pathways of decision making. Issues of who has and uses power, meaning the authority and authoritative structures surrounding the 'rules of business', designated responsibilities, rights and privileges, legislative systems and other institutions, are also a part of governance. Many of these issues are not resolved and will require socio-economic research into models for participative governance, equitable representation, and for achieving voice and power in business, social and environmental affairs in local communities.

The three levels of government have an important role in developing these structures. Ways should be found for working in partnership with local communities to help overcome barriers to change, provide leadership for innovation, deliver equitable and efficient services and share risk and responsibility in new business and infrastructure investment. Irrigation communities will have to develop a range of new regional structures and governance organisations and review their roles and responsibilities in and ownership of those structures and organisations. Further socio-economic research can help to achieve this.

Topic Area 14 - *Structural Adjustment and Support Measures*

Research into structural adjustment policies and support measures to help individuals, firms and industries to move away from obsolete investments and unsustainable production processes.

Irrigation areas will have to undergo structural adjustment in order to survive the forces impacting upon them. Both governments and the community can legitimately play a role in facilitating this adjustment and to help people and communities tackle and cope with change.

There is a case for positive measures to support businesses and communities create and recreate competitive advantage – this involves development of models of and measures for capacity building, leadership, risk sharing and new partnerships. There is also a case for ameliorating the effects of change by helping people, businesses and communities leave their present unviable occupations and enterprises and re-skill and/or re-invest in different ventures.

Socio-economic research is required into new approaches to encouraging structural change in irrigation areas. Without specific attention to structural change, potentially viable regional communities may fall by the wayside, locking resources in unproductive uses and placing an increased burden on welfare systems. There now appears to be a growing need for a proactive approach to structural adjustment in irrigation areas. Research is required in this area.

Topic Area 15 - *Planning Processes*

Research into models and processes for more integrated planning for resources management, land use, water resource conservation and allocation, catchment management and farm business sustainability.

Effective planning processes have a major role in helping communities and stakeholders generally, to reach agreement and cooperate. This enables communities to move beyond development of regional structural and corporate plans to the implementation of investment strategies for sustainability. Planning processes are important as a tool to aid and support stakeholder negotiations, and facilitate conflict resolution, decision making and the reaching of agreement. Such processes rely on accurate and timely data, research and analysis.

Planning is dependent upon capacity building within all sectors and at all levels and creation of a learning culture supported by state of the art information technology and expertise. Participative processes in which feedback loops ensure constant renewal of approaches to issues, and revision of management strategies, are necessary.

Sound procedures for review, accountability and commitment to change at all levels are also required. This is particularly so at the bureaucratic and political levels, given many changes required are structural and institutional. There is a need to encourage greater community involvement and commitment to these planning and political processes. This will require further research and extensive consultation to achieve acceptance of the necessary changes.

Topic Area 16 - Legal Frameworks

Research to explore appropriate legal, statutory and regulatory frameworks to encourage continuous improvement in the use and management of water and other natural resources, and assess the conventions and perceived rights, which are not necessarily grounded in statutes, but which influence behaviour and attitudes towards resources management.

'Institutions' are the legal and quasi-legal frameworks and structures, rules and conventions that govern our actions, relationships, ways of doing things and ways in which individuals and groups interact to achieve ends. These frameworks are given expression through law, statutes and regulations. They are reflected in, for example, legal and perceived entitlements, property rights and regulatory arrangements. By giving access to income streams and power to particular individuals and groups, institutions largely who benefits and loses from policies we implement and conventions we support.

Change is required in the policy agenda into appropriate legal and quasi-legal frameworks if we are to address emerging resource use issues and the socio-economic effects these are having. This will require new ideas on market arrangements, new, smarter ways to use regulatory measures and clearer policies on responsibilities and duty of care. There is lack of clarity about how to weigh up ideas in law against the wider socio-economic issues in irrigation communities, and the value of other mechanisms, such as accreditation of natural resources management activities and planning. There is also limited information on how legal and regulatory measures, and market power, might be mis-used by participants, giving rise to ecological, economic and social impacts.

A more holistic approach is necessary in the development of these ideas and measures, to take account of the impact they may have on the economic, social and cultural environment. For example, there is little information on the second and third round effects of water trading. Yet water trading, particularly where this is between regions and on a more permanent basis, can lead to the disintegration of communities. There is a lack of information on the characteristics of participants, who gains and loses from institutional change, the magnitude and location of socio-economic impacts, and timing of changes in rights. There are also issues in the communication of institutional arrangements to stakeholders, the administration and enforceability of laws and regulations and the adequacy of monitoring and feedback processes. Improved participatory processes are required to debate the uncertainties and develop effective institutions. There is a dearth of data and analysis on which to base these activities.

Priorities for Socio-economic Research

The 16 research topics identified above range across a number of disciplines, given the need for more holistic approaches to the present problems and issues in irrigation areas. Clearly NPIRD will be unable to fund all the R,D&E within these topics and the communication and extension effort that should accompany research. Thus priorities should be established to focus the work but still give insight across the 16 topics. Three priority areas for R,D&E have been identified in Figure 1. These are R,D&E into:

- community structures with linkages to several other topics, namely, social capital, capacity building, community structures, communications, partnerships,

- innovation, labour, water and other natural resources market and trading issues, governance, structural adjustment and legal framework;
- people or human relationships issues and communication in irrigation communities, with linkages to topics such as, community vision, relationships, partnerships, capacity, learning, innovation and community and regional planning structures; and
 - legal and quasi-legal frameworks and structures, with linkages to topics such as, communications, partnerships for investment, labour, water and other natural resources market and trading issues, structural adjustment and planning.

There is an urgent need for more information on the structure of irrigation communities and the linkages and motivational factors that will facilitate innovation and a learning culture. Knowledge about the efficacy and effects of legal and quasi-legal frameworks and structures within which we operate, is vital as these frameworks and structures determine responses from stakeholders, the capacity to adjust and take advantage of opportunities. Underlying all activity is the extent to which individuals and groups have the capacity and ability to learn, interact and innovate to respond to the changing agenda for continuous improvement.

Socio-economic R,D&E projects in these three areas are urgent and should be ongoing in irrigation communities, funded from pooled resources contributed through innovative partnerships between producers, industries, government and the community.