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Views on Irrigation Policy in Australia and Experiences from Brazil and China

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2007/08 IAL/NPSI TRAVEL FELLOWSHIP REPORT
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www.npsi.gov.au / www.irrigation.org.au
IAL is the Australian representative body of the International Commission on Irrigation and Drainage (ICID)

Biography

Kimberley Graham has a background in visual communication and has researched, worked and studied in international settings.

She achieved first class Honours in Natural Resource Management at The University of Melbourne in 2007. Her Honours project explored irrigation policy processes in Australia and China.

Kimberley was awarded the IAL/NPSI Fellowship in 2007, based on her proposal to undertake a survey of irrigation stakeholders views of irrigation policy in Australia and to examine irrigation policy in China and Brazil.

Kimberley currently works at WSP Environmental applying her visual communication skills with her experience in environmental policy and social research.

Executive Summary

Water policy in Australia is undergoing considerable and unprecedented change. Most recently, the emphasis on the sustainable management of water resources in the Murray Darling Basin has seen a shift of control from the States to the Commonwealth. The declining availability of water and the subsequent approaches taken by governments have come under increasing scrutiny from the public. Indeed, the actions associated with water policy in Australia, particularly water used for irrigated agriculture, have seen 'lively' political debates causing fragmentation within communities. The successful implementation of a policy is dependant on public support, especially water policy. We need to rethink how we 'make' policy in Australia if we are to successfully manage our water resources into the future.

The 2008 Travel Fellow toured Brazil and China to examine two diverse approaches to policy development, implementation and practice. The study of these countries' experiences offer valuable insights for Australian policy processes. Before visiting these countries a survey of Australian irrigation stakeholders was undertaken to identify topics of focus for the study.

The survey of Australian irrigation stakeholders clearly demonstrates the divergent views that exist regarding the way policy is made in Australia. The existence of divergent views has implications for policy outcomes, including potential policy failure, as public understanding and support is necessary for effective implementation of policy aims and goals.
The survey also highlighted the strong support for high levels of participation in policy development to achieve equitable outcomes. All levels of Australian Government may benefit from reflecting on the mechanisms that are necessary for this to occur.

Examining the water policy development and management in China and Brazil provided insights into:

- How different level of government can interact in policy development
- Community participation in water management

Examining the real-life application of different policy approaches can be a tool for developing a policy process for Australia that is equitable and inclusive of irrigation needs.

Contents

1. Preface and Acknowledgements

The findings from a 2007/08 Irrigation Australia/National Program for Sustainable Irrigation Fellowship Award to study irrigation policy processes and implementation in China and Brazil are documented in this report. The study period took place between the 5th to the 10th of January and the 18th of February to the 6th of March.

This extremely exciting and rewarding professional and personal opportunity would not have happened without the support and encouragement of many people, both in Australia and abroad.

Much gratitude is owed to IAL (formerly ANCID) who have provided valuable advice, assistance and mentoring and to NPSI for the financial assistance and enthusiasm towards my project. In particular, special thanks to Kim Russell, Anne Currey and Sarah Leonardi. Embarking on this fellowship truly was a dream come true for me and I applaud IAL and NPSI for providing young professionals with the opportunity to pursue their ideas and aspirations.

Recognition extends to The University of Melbourne, The Faculty of Land and Food Resources, for supporting this fellowship by providing extended journal and library access. Also, thanks to Deli Chen, Angela Cassar and YongPing Wei for their support and assistance.

The support of WSP Environmental (particularly Andrew Sweatman and John Cameron) in recognizing the importance of learning from world experience and allowing me to take the time away to achieve this goal. Completing this project would not have been possible without their constant support.

During the course of this fellowship I met with more than 100 individuals who gave up their valuable time to share experiences, answer my questions and provide valuable insight. I wish to thank each and every one of them for their generosity and I hope they also gained something from the encounter. Particular thanks to Robert Speed for helping a stranger, Roger Calow and Hui Li for being so welcoming, Jeff Camkin for enthusiasm and assistance and Henrique Chaves for exposing me to so many unbelievable experiences.

Finally I would like to thank my friends and family for ongoing and unconditional support. Without them, I would not have the courage to pursue my ambitions and ideas.

The following report goes nowhere near documenting all the information that was gained on the study tour, nor was it possible to fully reflect the immense knowledge, expertise and friendliness of all the individuals I was fortunate enough to meet. The enthusiasm and the valuable time that I received from many individuals was both inspiring and truly humbling.

2. Fellowship Background

The Australian National Committee on Irrigation and Drainage (ANCID), (now Irrigation Australia), has awarded a Travel Fellowship each year to encourage and promote the development of young professionals in the irrigation industry in Australia. The sponsor of this award is the National Program for Sustainable Irrigation (NPSI), a coalition of investors in sustainable irrigation research and innovation from throughout Australia. In 2007 I was fortunate to win this award and use the $10,000 to travel to irrigation districts in China and Brazil.

Irrigation Australia Limited (IAL) is a new peak body for the irrigation industry in Australia. The new organisation has resulted from the merger of the two major irrigation bodies – the Australia National Committee on Irrigation and Drainage (ANCID), representing irrigation water authorities and delivery companies, and the Irrigation Association of Australia, representing both rural and urban irrigation sectors from manufacturers and distributors to end users. IAL and NPSI are working closely together to ensure that this travel fellowship is continued into the future.

3. Fellowship Context

Water policy in Australia is undergoing considerable and unprecedented change. Most recently, the emphasis on the sustainable management of water resources in the Murray Darling Basin has seen a shift of control from the States to the Commonwealth. The declining availability of water and the subsequent approaches taken by governments, have come under increasing scrutiny from the public. Indeed, the actions associated with water policy in Australia, particularly water used for irrigated agriculture, have seen 'lively' political debates causing fragmentation within communities.

The successful implementation of a policy is dependant on public support, especially water policy, and so we need to rethink how we 'make' policy in Australia if we are to successfully manage our water resources into the future.

If successful and equitable policy outcomes are to be achieved, current policy processes in Australia will need to be revised to include participation of a variety of stakeholders. This research update discusses some of the key findings of the study and suggestions for improving policy development for irrigation.

The 2008 Travel Fellow toured Brazil and China to examine two diverse approaches to policy development, implementation and practice. The study of these countries experiences offer valuable insights for Australian policy processes. Before visiting these countries a survey of Australian irrigation stakeholders was undertaken to identify topics of focus for the study.

This Report is made up of 3 main sections. The first section details the results from a survey of irrigation stakeholders regarding irrigation policy in Australia. Using the survey outcomes as themes for examining irrigation policy and implementation in two contrasting countries provided a point of reference for examining the countries visitied.

The second section details the visit to China, which provided an understanding of how irrigation policy was developed between the Federal and the Provincial Governments. Also of interest was China's experimentation with Water User Associations, as it demonstrates a unique model of participation and water allocation.

The final section looks at Brazil, where a number of irrigation districts were visited that demonstrated the local and participatory management of water. In addition, the way in which rivers are classified as under either state or federal control may have relevance to Australia in light of the recent shifts of control in the Murray Darling Basin.

4. Australia

4.1. Background

The year 2007 started with the announcement of Prime Minister John Howard's 10 billion dollar National Plan for Water Security (NPWS), which represented an attempt by the Australian Federal Government to assume authority over the state controlled Murray Darling Basin. This initiated a series of turbulent debates and political conflicts relating to how decisions were being made in water management in Australia. For example, the NPWS was criticized for; lacking appropriate consultation; asserting federal control over the MDB and; scrutiny surrounded the basis of the assumptions of the national plan and how this translated into practice. The state of Victoria retaliated with its own state plan, the Food Bowl Modernization Project (FBMP). The FBMP initiated further public debate over how decisions were being made and aspects of the plan were brought into question, like for example, the proposed north-south pipeline.

The gap between recommended policy processes in the literature[1] and in practice appears to have expanded recently in Australia[2], as has been highlighted by lively social commentaries of recent policy process in water management in Australia[3]. Although the actions taken by the governments in Australia in recent years could be argued to be legitimate responses to a crisis situation, it does not detract from the overwhelming lack of visible policy processes that exist in policy making in Australia.

4.1.1. What is a policy process?

A policy process involves a rational; thought out procedure by decisions can be made. Bridgeman and Davis (2004) advocate a thorough policy process in their recommendations for an 'Australian Policy Cycle' which involves the following eight steps: identification of issues; policy analysis; policy instruments; consultation; coordination; decision; implementation and evaluation.

It appears that in Australia, decision-making does not follow any systematic policy process. It seems that decisions relating to water have been made with the expectation of uptake, void of adequate consultation with stakeholders and without an assessment of options against sustainability criteria[4].

The management of water resources (and more generally speaking, natural resource management) typically has a number of features that make it particularly challenging from a policy perspective:

- there are a variety of (affected or involved) stakeholders
- conflicts are not uncommon
- an element of uncertainty exists
- ambiguities may exist
- sustainability is the overarching goal

All of these factors ultimately equate to an extremely complex situation for policy-makers to address. The acknowledgement of these features may logically lead decision makers to consider policy processes that are capable of incorporating these elements.

4.1.2. Sustainability and the policy process

There are a variety of definitions surrounding the concept of sustainability. This poses challenges because interpretations of the concept are quite varying in nature, ranging from those which imply sustainability is of extreme importance to ecology and humanity, to those

[1] Bridgeman, P., & Davis, G. (2004), *The Australian Policy Handbook*, Sydney, Allen and Unwin.
[2] Hurlimann, A. (2007), *Time for a Water Revision*, Australasian Journal of Environmental Management, 14, March, 14-20.
[3] Newspaper headlines like 'Irrigators forced to pay', 'Farmers not getting their fair share', 'Howard threat to cut farm water', 'Politics muddy water reform plans', ' Support hazy on water plan', 'Alternative Water Solutions Needed', etc provide some insight into the level of social commentary on this issue
[4] Hurlimann, A. (2007), *Time for a Water Revision*, Australasian Journal of Environmental Management, 14, March, 14-20.

which use sustainability to conduct business as usual. A clear definition of sustainability is required if a consistent approach to policy is to be achieved and to furthermore maximise the outcomes of policies that state the aim of sustainable water management.

The United Nations Commission on Environment and Development (UNCED) define sustainability as '… *development that meets the needs of the present without compromising the ability of future generations to meet their needs*'[5] and is the most commonly adopted definition. This definition is challenging in the broader context of attempting to achieve the consideration of environmental, social, economic and cultural aspects of development when making decisions and critics have commented on its broad and subjective nature[6]. However, the subjectivity associated with defining sustainability is arguably the most important issue that requires consideration during policy development.

In Australia, sustainability concepts are addressed by The National Strategy for Ecologically Sustainable Development (NSESD) which intends to address key areas for action identified in Agenda 21[7]. This international Agreement calls for the building of participatory decision-making structures and capacity, improved information and institutional flexibility as a means for promoting sustainability[8]. The NSESD has no legislative basis in Australia, but a steering committee exists that reports every 2 years and participation is made up of 9 pluralistic working groups.

Meppem (2000) argues that too often in policy development, a particular meaning of 'positive' progress is privileged whilst anther is marginalised. Overcoming this requires the promotion of different ways of knowing in policy development and in doing so conventional wisdoms can be challenged. This questions the disciplinary orientations that structure the way our problems are being presented and provides us with a starting point for change. Meppem (2000) further elaborates that in recognising the tensions and contradictions that are part of planning for sustainable development enables an understanding of 'what is inevitably assumed away' due to the emphasis on technical rationality. This approach emphasises the need to explicitly recognise the contextual contingency of knowledge[9] and the necessity to explore diverse meanings. Therefore the emphasis becomes on how policy is developed in relation to:

- the quality of the process;
- the ability to build relations between stakeholders that reflect trust, and;
- enhanced learning and understanding of different goals and meanings.

This requires processes that actively negotiate what sustainability means[10]. Meppem (2000) articulates, that in neglecting to negotiate meanings and therefore facilitate a common understanding is effectively ignoring the complexity and uncertainty inherent in sustainability and policy planning. Participation can be seen as a core requirement of this process.

Of course, the author is well aware, that theory is 'easier said than done' and putting ideal policy processes into practice is not easy in real world settings. In real world settings, there are lobby groups to contend with, political needs to balance and a history that spans 200 years with contextually relevant considerations specific to each place.

However, reflection and a critical eye on these issues is warranted when considering:

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[5] Meppem, T., (2000) The discursive community: evolving institutional structures for planning sustainability, Ecological Economics, 3 (1), 47-61

[6] Beckerman, W., (1994). *Sustainable Development': Is it a Useful Concept?,* Environmental Values, White Horse Press, vol. 3(3), pages 191-209, August.

[7] The United Nations Conference on Environment and Development held at Rio de Janeiro in 1992 is an international agreement, signed by 183 world governments that calls for the building of participatory decision making structures and capacity, institutional flexibility and improved co-ordination of information as a means for promoting sustainability.

[8] Meppem, T., (2000) The discursive community: evolving institutional structures for planning sustainability, Ecological Economics, 3 (1), 47-61

[9] As highlighted by Meppem (2000), this position is reflected in the High Court of Australia's 'Wik Decision' in allowing Aboriginal Native Title to co-exist with pastoral leases.

[10] Dovers, S. (2000), *Beyond EverythingCare and EverythingWatch: Public Participation, public policy, and participating publics*, International Landcare Conference, Melbourne Australia.

- The recent emphasis on water security and the anticipated future uncertainty
- The level of public division and commentary
- Recent observations of government operations that are far from ideal

4.2. An online survey of Australian irrigation stakeholders regarding recent and future irrigation policy processes

A survey was developed based on the findings from an honours project undertaken by the author in 2007. A number of issues that emerged from indepth interviews with irrigation farmers, government emloyees and employees of water supply companies in a Victorian irrigation community formed the basis of the questions asked in this survey. This survey seeked to gain insight into respondents:

- Level of understanding on how irrigation policy is made in Australia
- Level of agreement that high levels of participation with a range of stakeholders would lead to more equitable policy outcomes
- Perception of the current level of participation occurring in irrigation policy
- Whether or not respondents felt irrigated agriculture in Australia is valued by: regional communities, urban communities, the general Australian public and the Australian Government.
- What type of decision-making relating to water management was valued the most: (local) state or central (federal).
- Future directions for irrigation policy in Australia

Respondents were also given the option of providing additional comments in relation to each question. A full list of the qualitative responses are available in a separate document.[11]

The survey was disseminated online to all Irrigation Australia members through Backwash and a link was also made available on the website (http://www.irrigation.org.au/).

A representative response rate was obtained from the four questions that required participants to select a response (*e.g. agree, disagree*). The final two questions invited participants to comment freely and therefore the responses from these questions demonstrate the variety of issues surrounding these topics.

The results from this survey will assist in informing areas of public concern in relation to irrigation policy in Australia.

4.2.1. Results

4.2.1. State of Residence and Occupation

It was seen as important to understand which state a respondent resided in, as different states have different concerns relating to water management in the MDB. The highest proportion of participants resided in NSW (19), VIC (18), QLD (13) and SA (9). Other states represented include TAS (1), WA (4), NT (3) and ACT (5).

Participants were also asked to indicate whether they worked for the: Federal Government (4), State Government (14), a private company (36) or were self-employed (15).

4.2.2. Understanding of how irrigation policy is made in Australia

Participants were asked '*How well do you understand how irrigation policy is made in Australia?*' The majority of respondents, indicated that they have 'some understanding' (46) of how irrigation policy is made in Australia (see table below). A minority of respondents indicated that they 'understand well' (10) with even less indicating that they understand 'extremely well' (5). A few respondents indicated that they have 'no understanding' (4). Some further comments were made in response to this question. Some examples include

- *Existing policies have major mistakes and make no sense at all*
- *Would like to have more information*

[11] The full list of the qualitative responses are available on the National Program for Sustainable Irrigation website (npsi.gov.au) or by contacting the author (Kimberley.graham@wspgroup.com).

- *Industry is not being listened to by Government*
- *Irrigation crosses many boundaries and affects the livelihood of many people*

4.2.3. High levels of participation would lead to more equitable policy outcomes?

Participants were asked to select their level of agreement for the statement: *'A policy that is developed by a process that involves all stakeholders produces better, more equitable outcomes than policy that is developed within government.'* The majority of respondents, strongly agreed with this statement (27) with a similar amount indicating that they agree (27). A few respondents disagreed (6) or strongly disagreed (2).

Some respondents provided additional comments and remarks in relation to this question. Although the overall trend was to agree with this statement, comments suggested that to aspire to this statement was unrealistic. For example, comments included:

- *Such a policy is a myth when the policy relates to water extractions with the Govt having the final say*'.
- '*Policy developed with stakeholders is better accepted but not always better for the industry as stakeholders are not always willing to do things that are beneficial. An example is measuring and reporting water use on farm.'*

Those who disagreed with this statement also explained why. For example, one respondent commented:

- *A policy that is created by stakeholders can often become a slower painstaking process (even morso than government) as the individuals can often become clouded with emotion and to procrastinate over certain issues with their own self-interest'*

There were also a number of comments that provided further support for the statement. An example of this is by one respondent

- *If stakeholders are not involved they will not implement the policies willingly. Stakeholders understand local conditions, problems, strengths and weakness of the system better than Government agencies*.

4.2.4. Level of participation in irrigation policy

Participants were asked to indicate what level of participation they thought was occurring in irrigation policy from a range of stakeholders in irrigation policy. The majority of respondents, out of 54 responses, indicated that there was 'some involvement' (28) or 'little involvement' (20). Some respondents indicated that there was 'a lot of involvement' (8), with less indicating there was 'no involvement' (3).

Further comments to this question raised issues such as

- the amount of time required to participate in policy decision
- whether or not the IAA provides input
- the cost of traveling to participate
- being too busy to participate
- the control by government of participation efforts.
-

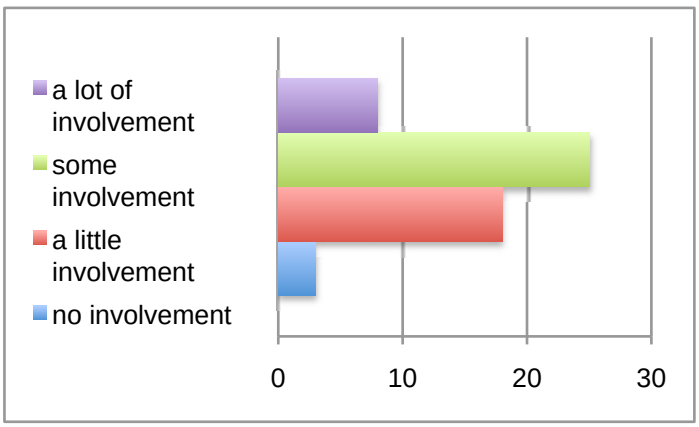

Figure 1 - How would you describe the level of involvement occurring from a range of stakeholders in irrigation policy in Australia today?

4.2.5. Irrigated Agriculture valued in Australia?

Participants were asked to indicate whether they felt irrigated agriculture was valued by: the general Australian public, urban communities, regional communities and the Australian government. A general consensus emerged that the general Australian public does not value irrigated agriculture, whilst all respondents indicated that regional communities do.

A number of issues were raised in the additional comments provided by respondents to this question. For example, two respondents pointed to the lack of labeling on Australian produce and that Australians are predominantly guided by price when it comes to purchasing food and this does not assist in communicating value to the Australian public. A number of respondents also commented on the lack of understanding of 'city dwellers', of what is involved with food and fibre production and what this involves.

4.2.6. Local versus central decision-making

The next question in the survey was purely qualitative. It asked respondents *'Recently in Australia there has been a move by the Federal Government to assert more control over the management of water resources in Australia, with a focus on irrigation in the MDB. What are your thoughts on a more localised system of water management (state) versus a centralised system (federal) of decision making? (Do you think one is better than the other? They are both necessary? why?)'*

There were 37 responses to this question. Overall, respondents fell into 4 categories (a couple of examples of each will be provided):

1) central decision making at the federal level;

- *I agree with the federal system. There is no room for parochial state politics with a river system that crosses state borders.*
- *History of failure shows it must be centralised*

2) local decision making at the catchment scale

- *I believe that local management is more relevant as otherwise you tend to end up with one size fits all and we know that this is rarely the best outcome. This is exemplified in the coastal versus inland debate in NSW*
- *Local management is always best because it is people looking after their own futures with less need for government support. Gov't may be involved at high level strategic and policy making but leave the operational stuff to people who know how it works on the ground.*'

3) decision making at the state level

- *Controlled by state with links to federal as supply and demand differs from state to state and supply is linked*
- *water is a cross-boarder resource for which the States are more relevant as deliverers of construction and operating services or implementation of, say, modernisation plans rather than each striving to be the highest instance in the policy apparatus; fix the water problem and 'fuel up' irrigated agriculture – with all the employment, social cohesion and economic / export dollar outcomes – and the States can/should d their own thing in terms of where they re-invest the economic added value; for that they are indeed elected'*

4) an overall strategic guideline or vision by the federal government that supports local management.

- *You could liken it to Aus Standards, the Feds could draft a minimum policy with state/local having the authority to enhance but not diminish the minimum standards*.
- *I believe a national vision which supports local management is in our social and environmental interests and the interests of our future.*

As can be seen by the responses, decision making at different levels of government have advantages and disadvantages as there are a variety of issues associated with each system. Australia has seen a move towards federal control of the MDB, which raises issues

associated with how policies are made and the implementation of policies.

4.2.7. Future Directions of irrigation policy in Australia

Respondents were asked '*In Australia what aspects of irrigation policy do you think require attention? Or, put another way, can you suggest one or two key actions that you think would improve irrigation policy in the future?*' 38 respondents provided comments to this question. Due to the variety of responses, only a few themes will be highlighted here.

Quite a few responses alluded to issues surrounding policy development such as; transparency, accountability and stability. Examples of this include:

- *Clear lines of responsibility and accountability between decision makers. These need to be articulated, and shared so they are clearly understood by all stakeholders*
- *More knowledge by Government prior to implementing policy*
- *A key action would involve providing some stability in policy*
- *you have the most knowledgeable people in the industry not involved in the decision making process*
- *All aspects of irrigation policy need attention. Most desperate is a need for a fair and rational distribution of allocations throughout the MD Basin and a sane and rational set of policies for distributing severely limited resources in time of drought. The present restrictions in South Australia are absurd and damaging beyond belief. They could only have been devised by politicians who have left matters far too late to permit the luxury of taking informed technical advice*

Another theme emerged that centred around the value of irrigated agriculture.

- *its un-avoidable that General public - most of which are urban (85%?)take agriculture and irrigated agriculture for granted but are put into a situation where buying imported product is readily available, cheaper, than Australian made or foreign owned Australian packaged product. There is also a lack of branding by "Irrigated Agriculture" or you just don't know where a product comes from; causing it to be treated as part of the big mixed bag; losing value*
- *The true value of water, ecomonic AND social. The importance of food and fibre security. Irrigation and its place in responsible environmental management*

The need for a shared vision for the irrigation industry was also highlighted:

- *We need to know what services (i.e. social and environment) that Australia expects to see delivered from the rural sector in 20-30 years time. Water policy should be guided to deliver those priorities. Without this guidance, there seems tremendous risk of water policy being created without any sense of whether it can be implemented, or the long term costs of implementation*

4.2.2. Summary of Key Findings

This study attempted to gain an insight into a number of issues surrounding recent irrigation policy. The survey of irrigation stakeholders found that:

- The majority of respondents have 'some understanding' of how irrigation policy is made in Australia
- Almost all respondents either agreed or strongly agreed with the statement: '*high levels of participation will lead to more equitable outcomes'*
- 'Some' or 'a little' involvement from a range of stakeholders is perceived to be currently occurring in irrigation policy
- Irrigated agriculture is perceived to be valued by regional communities, but not by the general Australian public
- A variety of ideas exist in relation to the appropriate level of government for irrigation decision making

One of the most important outcomes of the survey was the overwhelming responses, both in quantity and quality, in relation to suggested improvements for the future of Australian irrigation policy. This helped to highlight further gaps and directions for the future development of irrigation policy.

5. The People's Republic of China

China is often sited as 'exemplifying' the global water situation. With it's rapid development and subsequent pressures on agricultural systems, China has grave water scarcity issues. Pollution continues to exacerbate usable water and this is contributing to groundwater being over exploited. As with many developing countries, China has control and enforcement issues. Cultural factors also play a large part in understanding the local context, as cultural norms will often be a stronger determinant in motivating the population than legal frameworks. For example, the western notion of enforcement is somewhat undesirable in Chinese culture. The balance of social harmony is maintained through an elaborate system of moral rules. This has implications for examining policy development and implementation in China.

In China I was hosted by the Water Entitlements and Trading (WET) team in Beijing. My primary contact there was Roger Calow. I anticipated a visit to Inner Mongolia whilst on the Fellowship, however this trip did not go ahead.

I spent a week in the WET office with the WET team in Beijing. I spoke to most of the team members, including Roger Calow and Hui Li. and also had other meetings organised for me. I will highlight some of my discussions and findings from meetings here.

I have previously undertaken 2 research projects in China. The first was in 2006, through an International Undergraduate Program from the University of Melbourne. This project aimed to understand the attitudes and beliefs regarding water use that were considered by irrigation farmers in an irrigation district in Shanxi province. The second project, in 2007, formed part of my honours project and included being involved in the planning process for the Shanxi Province Irrigation and Modernisation Plan. Therefore, as I already had some insight into both the on the ground and Provincial government irrigation activities, my primary aim in China for the fellowship was to understand the interactions at the National level. As all Provinces in China act with a certain amount of autonomy, I saw this as important, particularly with respect to the recent assertion from the Federal Government in Australia.

Figure 2 - Past Field work in China

Figure 3 - Chinese farmer in Shanxi Province

5.1.1. Water Use in China

The consumption per sector is constantly being adjusted. In 1980 agricultural consumption (including forestry and wetland) made up 88% of total water use, while industry consumed 10% and urban use made up 2%. In 2003 agricultural use had dropped to 66%, industrial use had increased to 22.1% and urban use increased to 11.9%. Agriculture by far consumes the largest amount of water with more than 80% being used for irrigation. However, with a growing population, urban use is increasing at an alarming rate. According to the UNDP, UNEP, World Bank and World Resources Institute, China will be classified as water stressed by 2010, if the current rate of population growth continues and will become the most water

stressed country in East and South-east Asia[12].

5.1.2. Participation in Chinese Irrigation Policy – WUA's

Roger Calow's role in the WET project was to investigate the role that Water User Associations might play in rights reform in an irrigation district. Roger explained to me that China has been experimenting with Water User Associations (WUA's) since the 1980's and therefore participation in water resource management has been occurring in one way or another for some time. However the way in which WUA's operate can vary considerably from Province to Province. In most cases the WUA operates in the following way.

A bulk delivery of water is made to the WUA in return for a pre-payment. Each WUA is allocated a group right (GWR). The allocated amount is based on a calculation of the water requirement deemed necessary for a given area. The WUA's members are (theoretically) elected by farmers within hydrological basins. The WUA is responsible for operation and maintenance, distribution of water, giving advice, resolving disputes and collecting fees from farmers. For this the WUA gets a slice of the sales (about 3%), which pays for the salaries of the fulltime members (like for example the Chair and Deputy Chair).

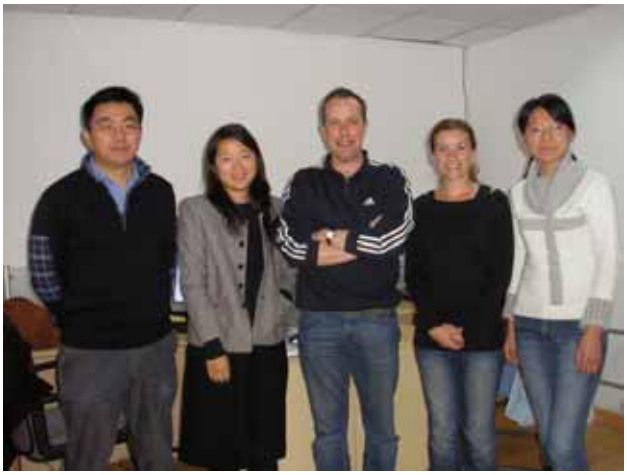

Figure 4 - The WET Team in Beijing

Figure 5 - Meeting with MOWR in Tea House

5.1.3. Interaction between Provincial and National Governments

China has constructed an elaborate array of institutional bodies to manage it's water resources. However, until recently water saving has not been a priority for policy makers. Historically the water system was designed to manage systems to prevent floods and to actively divert and exploit water resources for industrial and agricultural production. Water policy is created and executed primarily by the Ministry of Water Resources (MWR).

I met with HongXing Zhang and YongPan Lin who work with the Ministry of Water Resources in irrigation policy development. HongXing and YongPan talked to me about the interaction between the Provincial and the National government during irrigation policy development.

HongXing and YongPan explained to me that the Provincial level irrigation plan was based on the National level policy, however each Province is able to exert different ways of implementation.

In order to develop an irrigation plan at the National level, the National government will first survey all the dams and other relevant data. This information will then be handed to the provincial level. The Provincial government then provides information back to the National level. The National irrigation plan is then adjusted to include the parameters of all the

[12] Shalizi, Z., (2006) Addressing China's growing water shortages and associated social and environmental consequences, In P.R.W.P. 3895 (Ed.) World Bank.

provinces. This process can take up to 3 years. Yin and Zhang were keen to point out that both a bottom up and top down approach exists in irrigation policy development in China.

HongXing and YongPan had both spent time in Australia and so I was keen to understand their perspectives on Australian water management. Both of them sited the strength of the Australian legal system as aiding in the success of initiatives such as water restrictions. They felt that successful results would not be possible in China. HongXing and YongPan also commented that the government was too influenced by the public. Their impressions were, that if one person disagreed with a policy, then this could cause the policy to be changed.

5.1.4. Insights from China

A lot can be learned from Chinese policy development and implementation, as in may cases Australia shares quite a few similarities with China with regards to scarcity issues. Examining water policy development and management in China provided insights into:

- how different levels of government can interact in policy development
- models of community participation in water management
- bulk allocation of irrigation water
- the influence of culture on policy implementation
- exacerbated water scarcity

6. Brazil

The home of the Amazon River Basin is often not considered to have water scarcity issues. However, the semi arid regions of Brazil can endure 9 months of the year without rain (which is where you can find large irrigation districts) and severe water conflicts are common around large urban centres, like Sao Paulo. Adequate sanitation is increasingly the most challenging issue facing the country, with roughly 90% of sewerage entering rivers and streams as untreated effluent. Although Brazil faces a number of challenges surrounding monitoring and enforcement, the observed and documented investment in institutional capacity is outstanding.

In Brazil, I was hosted by the generous and enthusiastic Dr Henrique Chaves.

I spent a week in Brasilia with Henrique and this was one of the busiest weeks of both our lives! Thanks to Henrique I met and talked to so many incredible people, from almost every organization that is somehow involved in water. Highlights included meeting the Director of the World Bank in Brazil and meeting passionate individuals from The Nature Conservancy.

After Brasilia, I had itineraries organised for me to visit Forteleza and then to Petrolina where the scale of irrigation projects, in an area that receives so little rain is unbelievable. The Nature Conservancy and IBM also invited me to a conference in Sao Paulo. This conference included a field trip to understand the complexity and conflicts associated with Sao Paulo's water supply as well as visiting the first farm in Brazil to receive payments from the government for 'ecological services' to improve water quality.

Due to the overwhelming success of the Brazilian component of my fellowship, only some highlights will be drawn upon here.

Figure 6 - Lake Sobradinho in Pernambuco

Figure 7 – CORDEVASF in Brasilia

6.1.1. Water use in Brazil

Brazil compromises 26 states and 12 hydrologic regions. It has an estimated 10-14% of the world's fresh water but a lack of uniformity in water distribution has been and continues to be a challenge for brazil. The semi-arid northeast region has 18% of Brazil's land mass and 28% of its population, but only 3% of its available water resources. The region has been under considerable drought pressure for the last 10 years. 70% of Brazil's water use is for irrigated agriculture.

Liberation from a Dictatorship model of governance has seen the Federative Republic of Brazil actively decentralize and incorporate participatory models in irrigation decision-making processes and management systems.

6.1.2. Participation in Irrigation Management in Ceara

Whilst in Brasilia, I was fortunate enough to have a visit to Fortaleza organised for me. In

Forteleza I was hosted by Nelson Neiva de Figueiredo from COGERH (Compania de Gestao de Recursos Hidricos).

Ceara is the poorest state in Brazil (49% living in poverty). It is the only state in Brazil without permanent rivers and the groundwater resources are limited, with high salt content. The state of Ceara lies in the semi-arid region of Brazil, with rainfall only occurring in 4 months of each year. COGERH is responsible for the assimilation, operation and maintenance of the bulk water resources facilities of the state. COGERH works to the demands of water committees and water allocations are constantly being adjusted as a result of the outcomes of monthly meetings. There are 11 basins and 11 committees in Ceara, plus some small committees for dams. The committees are made up of 30% users, 30% civil society, 20% municipality and 20% state and federal representatives. Each month, after the rain period has ended, the outcomes from the committee meetings determine the adjustments and priorities for water allocations.

Figure 8 - World Bank in Brasilia with John Briscoe

Figure 9 - TNC Field Trip to 'ecological services' farm

6.1.3. Institutional arrangements

The National Integration Agency is responsible for the formulation of the National irrigation Policy. This agency takes loans from the World Bank, or other organisations and provides the funding to other bodies, such as CORDEVASF, to build the infrastructure. CORDEVASF then builds the infrastructure and creates irrigation districts and sells plots to large and small farmers. Extremely poor people are entitled to access to some of the developed land. Large farm operators and corporations bid to buy the rest of the land and normally pay through 2 tarrifs over 20 years. K1 tariff is the operation and maintenance and the cost of water and energy and the K2 tariff covers the land and infrastructure.

Management of surface waters which cross state or national boundaries are a federal responsibility, while surface waters that are contained wholly within a state are the responsibility of that State. Groundwater management is a state responsibility although the federal government may have a role in international negotiations or assisting resolution between states. The federal government generally assists in the resolution of water resource management issues between states.

6.1.4. The World Bank

I was lucky enough to meet John Briscoe, the director of the World Bank in Brazil. The World Bank provides significant funding to water related projects with the aim of improving livelihoods and alleviating poverty. John Briscoe was very interested to hear about the Fellowship and the recent policy developments in Australia. He also provided an 'international perspective' of the Australian situation. John expressed that Australia is viewed as one of the leaders in water resource management globally and he found it surprising to hear about the amount of conflict and social unrest that was occurring as a result of different policy decisions.

I think this it is interesting to point out this perspective, as external impressions of a countries water management can be quite different to internal impressions.

Figure 10 - Henrique Chaves and I after a hard week!

Figure 11 - TNC & IBM Field Trip

6.1.5. Insights from Brazil

A number of insights can be gained from the experiences of Brazilian water management.

- Local participatory models, like for example in Ceara, mean that water supply company's work to the mandate of stakeholder committees. This enables: water allocations and services to adapt to changing needs and climatic conditions.
- A river, steam or tributary is classified as under the control of the Federal Government if it crosses a state or international boundary.
- The strong emphasis on institutional transparency and flexibility to facilitate inclusive processes
- The emphasis on long term goals and the investment in the required processes to achieve them

Figure 12 - Ministry of Regional Integration in Brasilia

Figure 13 - Water Supply of Brasilia

7. Discussion

This study attempted to gain an insight into a number of issues surrounding recent irrigation policy. The survey of irrigation stakeholders found that:

- The majority of respondents have 'some understanding' of how irrigation policy is made in Australia
- Almost all respondents either agreed or strongly agreed with the statement: '*high levels of participation will lead to more equitable outcomes*'
- 'Some' or 'a little' involvement from a range of stakeholders is perceived to be currently occurring in irrigation policy
- Irrigated agriculture is perceived to be valued by regional communities, but not by the general Australian public
- A variety of ideas exist in relation to the appropriate level of government for irrigation decision making

One of the most important outcomes of the survey was the overwhelming responses, both in quantity and quality, in relation to suggested improvements for the future of Australian irrigation policy. This helped to highlight further gaps and directions for the future development of irrigation policy.

Using the survey outcomes as themes for examining irrigation policy and implementation in two contrasting countries provided a point of reference so that effective comparisons could be made to aspects of Australian policy development and implementation.

The tour of China provided an understanding of how irrigation policy was developed between the Federal and the Provincial Governments. Also of interest was China's experimentation with Water User Associations, as it demonstrates a unique model of participation and water allocation.

In Brazil, a number of irrigation districts were visited that demonstrated the local and participatory management of water. In addition, the way in which rivers are classified as under either state or federal control may have relevance to Australia in light of the recent shifts of control in the Murray Darling Basin.

7.1.1. Messages for policy makers

The findings from the survey highlight a number of key focal points for decision makers. Two points of particular importance to the irrigation community are:

- Meaningful and accessible participation in decision making
- Promoting the value of irrigated agriculture to the general Australian public

This study also highlights the divergent views of the irrigation community regarding irrigation policy in Australia. Areas of public concern, such as irrigation policy, that are characterised by complexity and uncertainty require alternative policy processes to what currently exist.

Embracing and actively negotiating divergent views becomes increasingly important when considering broader goals of sustainability and successful compliance with policy aims. It is highly advisable for any policy maker reading this to familiarise themselves with the range of qualitative responses in order to gain an understanding of this.

Examining water policy development and management in China and Brazil provided insights into:

- how different levels of government can interact in policy development
- community participation in water management

Examining the real-life application of different policy approaches can be a tool to developing a policy process for Australia that is equitable and inclusive of irrigation needs.

7.1.2. Conclusions and recomendations

In Australia there have been recent and dramatic changes in water policy. These changes have not been met with widespread public support, which has implications for successful policy implementation.

In China, there is no expectation for government to be open and transparent or for stakeholder involvement to occur in policy development. In Brazil, there is a strong expectation for information to be available and for participation to occur at all stages of policy development. China displays insights into relatively rapid solutions to water management, whilst Brazil aims for the best possible outcome with a more long term perspective. Australia can learn a lot from the real world experiences of these two differing countries.

It is important for Australian governments to reflect and identify what mechanisms will be necessary to achieve sustainable, equitable and rational outcomes for water management moving forward. As water affects and involves a variety of stakeholders, it makes sense to the author for this reality to be reflected in decision-making processes. Flexible institutional arrangements, open and transparent operations, goals that are not constricted by political factors and undertaking the necessary steps for a shared vision for the irrigation industry to be realized may be worth considering by Australian Governments when moving forward.

It is interesting that Australia is heralded internationally as a prime exemplar of outstanding water management[13] and yet internally there is considerable tension and unrest.

It is the hope of the author, that by highlighting issues of public concern regarding irrigation policy, attention will be drawn to this important issue. Water used for irrigation will conceivably adapt and change in the coming years, however this adaption should be the result of a consensus. When we are talking about irrigation we are talking about livelihoods, the environment, our supermarkets, the economy, and the community. The value and complexity of this, needs to be actively recognized and embraced.

[13] For example, John Briscoe, the Director of the World Bank in Brasilia expressed this view to me.

8. Communication

In addition to a presentation at the 2008 Irrigation Australia Conference I will give a presentation to:

- The QLD government on September 5, 2008
- The presentation at the Sustainable Irrigation Forum in Canberra, September 1, was waived by NPSI.

I plan to continue presenting my travel findings to:

- Australian Water Association members;
- Other opportunities as they arise.

I have published an article for;

- Irrigation Australia Journal (August 2008)
- NPSI Research Bulletin Update (July 2008)

9. Financials

Airfares		$ 5,000
Accommodation		$
Brazil (30 days)	$ 5,340	
China (5 days)	$ 457.68	
Food, Immunisations and Visa's		$ 1,200
TOTAL		**$ 11,997**

This financial summary does not include costs associated with traveling to Bundaberg to accept the award, or additional traveling costs associated with traveling for presentations post-fellowship in Australia.

10. APPENDIX 1: ITINERARY

Date	Contact	Area/Department	Objectives
06/01/2008	Roger Calow	Water Policy Specialist, WET Project	Introduction to WET project and organise meetings
07/01/2008	Roger Calow	Water Policy Specialist, WET Project	Discuss WET project and participation in policy development in China (WUA's)
08/05/2007	Hui Li	WET Project Assistant and Coordinator	Discuss perspectives of Chinese and Australian water policy and culture
	Min Zhu	WET Project Support	
09/01/2008	Hongxing Zhang	Ministry of Water Resources	Discuss the National and Provincial Government Interactions in Policy development
	YongPan Lin		
10/01/2008	Depart China		
14/02/2008	Arrive Brazil		
18/02/2008	Dr Henrique Chaves	Universidade do Brasilia	Organise week and meet postgraduate students
19/02/2008	Dimetrios Christofidis	Ministry of Regional Integration	Discuss Irrigation Policy Development and issues in Brazil
20/02/2008	Suzanna Alipaz	CAESB	Field Trip to Brasilia's water supply
	Ben Bragga	ANA	Introduction and welcome to ANA
	Marie-Violaine Chabrel	ANA - Office of International Affairs	Discuss Fellowship and Ben Bragga's visit to Australia
	Devanir Garcia	ANA – Water conservation program	Discuss agricultural policy, water management and land management, water control
	Luciano Menesis	ANA – Permit Manager	Presentation of Brazil's Water policy with specific reference to environmental flows and definitions
	Agustin Trigo	ANA – National Hydrological Information	Brazil's National hydrological Information system
21/02/2008	Herminio Hideo Seguino	CORDEVASF – Water Soil and Forest Conservation	Challenges of implementing environmental programs
	Federico Orlando Calazans	CORDEVASF – Manager of Irrigation Projects	Organise trip to the North

Date	Contact	Area/Department	Objectives
	John Briscoe	World Bank - Director	Discuss World Banks role in Water Projects in Brazil
21/02/2008	Timothy Milikan	Australian Embassy – Acting Embassador	Discuss potential collaborative arrangements between Australia and Brazil. How to promote and facilitate further official cooperation.
	Sergio Koide	Universidade do Brasilia – Professor in Hydrology	Discuss social issues in water management, including politics and corruption.
	Rodrigo Correa	Universidade do Brasilia	Discuss further collaboration between Australia and Brazil
	Albano de Araujo	The Nature Conservancy	Discuss conservation and information technology
	Barbara Brakarz	The Nature Conservancy	Discuss Water Projects
	Ana Cristina Barros	The Nature Conservancy	Invitation to Conference in Sao Paulo
	Suzanna Alipaz	CAESB	Field trip to Brasilia sewage treatment plant and carp filtration trials and community projects
25/02/2008	Nelson Neiva de Figueiredo	COGERH - Fortaleza	Introduction to COGERH. Participation in water management in Ceara. Field Trip to large irrigation channels and supply systems
27/02/2008	Ilsa Lima	CODEVASF - Petrolina	Video introduction to CODEVASF. Field Trip to Lake Sobradinho and water pumping station. Visit to a farm.
	Andre Duarate	AMACOCO	Visit to Coco nut water production and Packing House.
04/03/2008	Albano Araujo	The Nature Conservancy	International workshop on decision support systems for watersheds: Challenges and Opportunities
05/03/2008	Henrique Chanves	Universidade do Brasilia	International workshop on decision support systems for watersheds: Challenges and Opportunities
06/03/2008	Glauco Freitas Barbara Brakarz	The Nature Conservancy	Field Trip to Minas Gerais to visit the first farm in Brazil to receive payments for ecological services. Also visited SABESP to learn about the complex water supply system for Sao Paulo.
15/03/2008	Gert Bolton	Engineer	Visit to Organic Farm outside Porto Alegre.