24th International Congress on Irrigation and Drainage

3-10 October 2022, Adelaide, Australia

11th N.D. Gulhati Memorial Lecture for
International Cooperation in Irrigation and Drainage

Putting People at the Heart of What We Do

Hon. Karlene Maywald

South Australian Water Ambassador and Chair of the Australian National Water Commission (Australia)

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INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE
COMMISSION INTERNATIONALE DES IRRIGATIONS ET DU DRAINAGE

11th N.D. Gulhati Memorial Lecture for
International Cooperation in Irrigation and Drainage
on

"Putting People at the Heart of What We Do"

Presented at

24th International Congress on Irrigation and Drainage, 2022

and delivered by

Hon Karlene Maywald, DUNIV, FTSE, GAICD
South Australian Water Ambassador

The Hon Karlene Maywald is currently the South Australian Water Ambassador. Her previous roles include South Australian Minister for Water Security and the River Murray, Murray Darling Basin Ministerial Council Member and Chair of the Australian National Water Commission.

Karlene is currently Managing Director of Maywald Consultants and holds a portfolio of Board positions including Chair of WaterAid Australia, Chair of the Peter Cullen Environment and Water Trust and she is a Chair of Cancer Council SA, as well as a Director of WaterAid International and the Australian Water Association.

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5 October 2022, Adelaide, Australia

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INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE


INTERNATIONAL COMMISSION ON IRRIGATION & DRAINAGE
SIXTH CONGRESS INDIA - 1966

Er. N.D. Gulhati
A Visionary Water Resources Engineer

(1904-1978)

Er. Niranjan Das Gulhati, popularly known as N.D. Gulhati, a visionary, was one of the forces behind India's march towards food self-sufficiency through Green Revolution. As the Chief of the Natural Resources Division in the Planning Commission, Government of India, he laid its foundation by initiating proposals relating to the development of irrigation and power, soil conservation and mineral development in the First Five-Year Plan. The notable positions he held in Government of India service includes Secretary, Central Board of Irrigation and Power (CBIP) from August 1945 to March 1949; Chief Engineer and Joint Secretary in 1953 and Additional Secretary to Government of India in 1958. While serving on these positions, he championed the cause of irrigation and drainage at national and global level.

As the Chief Representative of Government of India on the Indus Water Negotiations under the aegis of International Bank for Reconstruction and Development (IBRD), he played a key role in the successful conclusion of the historical Indus Water Treaty between India and Pakistan in 1960 (ratified in 1961). He represented India in many international engineering conferences and made immense contributions to India's agricultural, water and power sectors.

In recognition of his ''distinguished services of a high order'', Er. Gulhati was bestowed with one of India's highest civilian honours "PADMA BHUSHAN" by the President of India in 1961.

Late N.D. Gulhati dedicated his entire professional life to the development of irrigation engineering and conceived and implemented the concept of an 'International Commission' for ensuring international cooperation on advancing the world knowledge in the fields of irrigation, drainage, flood management and river training by pioneering the idea of setting up an International Commission to the Government of India in 1946. The Commission was set up in the year 1950 and Er. Gulhati was befittingly selected as its first Secretary General to lead its operations in its budding period. Later he led the Commission from the forefront holding positions of Vice President (1957-1960), and President (1960-1963) of ICID.

President Honoraire Gulhati was a globally renowned Water Resources Consultant, whose services were utilized by many State Governments in India and global organizations like IBRD (1963), International Development Association (1963-1973), and United Nations (ESCAP) in 1969.

Born on 15 November 1904 in Lahore, Pakistan, Er Gulhati completed his technical education from the Thomson Civil Engineering College, Roorkee in 1926 (later University of Roorkee and now IIT Roorkee) where he achieved honours. He was appointed to the Indian Service of Engineers in October 1927 and posted to the Irrigation Branch of the Public Works Department, Punjab. Er N.D. Gulhati passed away in December 1978.

Er. Gulhati was amongst the foremost supporters of ICID and did everything possible to promote the objects of ICID. His mature leadership, dynamic personality and diplomatic and adroit handling of all matters won him universal respect and endearment with all the members of the ICID fraternity. As the architect of the "International Commission" who laid a strong foundation for Commission's growth during its nascent years, Er. Gulhati has been aptly called the 'Father' of ICID.


PRESIDEN

THE N.D. GULHATI MEMORIAL LECTURE
for International Cooperation in Irrigation and Drainage

Preserving the memory of the visionary Water Resource Engineer, ICID, in collaboration with Gulhati Trust has been organizing the 'N.D. Gulhati Memorial Lecture for International Cooperation in Irrigation and Drainage' at the time of its triennial Congresses. The memorial lecture aims at encouraging exchange of significant global developments relevant to irrigation and drainage engineering including all allied aspects like environment, sociology, economics etc. and fostering and enhancing international cooperation to meet ICID objectives. The lecture is delivered by an invited eminent person in a field related to ICID's mission. An honorarium of US $ 1000 is presented to the invited distinguished Lecturer as a token of appreciation.

N.D. Gulhati Memorial International Lectures held so far:

Dr. Felipe Ignacio Arreguín Cortés
Director General, Mexican Institute of Water Technology / Instituto Mexicano de Tecnología del Agua (IMTA),
Delivered the tenth lecture in 2017 at Mexico City, Mexico on "Reforms in the Administration of Irrigation Systems: Mexican Experiences".

Prof. Dr. Chandra A. Madramootoo
Dean, Agricultural and Environmental Sciences McGill Unviersity, Canada
Delivered the seventh lecture in 2008 at Lahore, Pakistan on "Irrigation in Context of Today's Global Food Crisis"

Mr. Jeremiah R.D. Lengoasa
Deputy Secretary-General
World Meteorological Organization, Switzerland
Delivered the ninth lecture in 2014 at Gwangju, Korea on "Climate Variability and Change: Impacts on Water Availability"

Er. Albert J. Clemmens
Founding Member and Director
American Academy of Water Resources Engineers, USA
Delivered the sixth lecture in 2005 at Beijing, China on "A Process-Based Approach to Improving the Performance of Irrigated Agriculture"

Dr. Charles M. Burt
Professor of Irrigation and Chairman of the Irrigation Training and Research Center (ITRC), USA
Delivered the eighth lecture in 2011 at Tehran, Iran on "The Irrigation Sector Shift from Construction to Modernization: What is Required for Success?"

Dr. Marvin E. Jensen
National Program Leader, Water Management and Salinity Research, Agricultural Research Service, USDA, USA
Delivered the fifth lecture in 1993 at The Hague, Netherlands on "The Impacts of Irrigation and Drainage on the Environment"

Late W.R. Rangeley OBE
Independent Consultant, Water Resources
Development, World Bank, UK
Delivered the fourth lecture in 1990 at Rio de Janeiro, Brazil on ''Irrigation at a Crossroads''

Late Adriaan Volker
Professor Extra-Ordinarius in Hydrology
Delft University of Technology, The Netherlands
Delivered the third lecture in 1987 at Casablanca, Morocco on ''Role of Failures and Negative Secondary effects in the Development of Irrigation, Drainage and Flood Control''

Late K.K. Framji
Chief Engineer and Joint Secretary
Ministry of Irrigation and Power, Government of India
Delivered the second lecture in 1984 at Fort Collins, USA on ''Past and Likely Future Developments in Irrigation and Drainage and Flood Control Measures in Developing Countries''

Prof. Dr. M. Holy
Dean of Civil Engineering
Prague Technical University, Czechoslovakia
Delivered the first lecture in 1981 at Grenoble, France on ''Irrigation Systems and their Role in the Food Crisis''

Prize winning papers of Young Professionals

Er. R. Rajkumar
Lecturer, Civil Engineering
Centre for Water Resouces Anna University, India
Winner of the Second N.D. Gulhati International Award in 1999 for the Best Paper contributed to an ICID Congress titled at Granada, Spain on "Controlled Water Saving Method for Paddy Cultivation - A Case Study"

Ms. Margreet Z. Zwarteveen
Gender Specialist, IWMI, Sri Lanka
Winner of the First N.D. Gulhati International Award in 1996 for the Best Paper contributed to an ICID Congress titled "A Plot of One's Own: Gender Relations and Irrigated Land Allocation Policies in Burkina Faso"

11th N.D. Gulhati Memorial Lecture for International Cooperation in Irrigation and Drainage

"Putting People at the Heart of What We Do"

Hon Karlene Maywald*

First of all, I acknowledge and pay my respects to the Kaurna people, the traditional custodians whose ancestral lands we gather on. Further, I acknowledge the deep feelings of attachment and relationship of the Kaurna people to country, and we respect and value their past, present and ongoing connection to the water land in which we live.

It is a great honour and pleasure for me to be here with you today on the occasion of the opening of the 24th Congress of the International Commission of Irrigation and Drainage, together with the 73rd International Executive Council Meeting and the Irrigation Australia International Conference and Exhibition.

It is also a privilege to be presenting this N.D. Gulhati Lecture on International Cooperation in Irrigation and Drainage.

The N.D. Gulhati Memorial Lecture has been organised by the International Commission for Irrigation and Drainage in collaboration with the Gulhati Trust since 1981, in honour of the visionary water resources engineer, Er Niranjan Das Gulhati, the driving force behind the establishment of the International Commission for Irrigation and Drainage.

The memorial lecture aims to encourage the exchange of significant global developments relevant to irrigation and drainage engineering, including all allied aspects like the environment, sociology and economics, as well as fostering and enhancing international cooperation to meet the International Commission for Irrigation and Drainage's objectives.

It is a testament to the vision of Er Gulhati that the objective of the lecture so clearly aligns with the theme of this year's Congress some 40 years later – 'Innovation and research in agricultural water management to achieve sustainable development goals.' It is also pleasing to note that what Er Gulhati envisaged as being essential to global cooperation in irrigation aligns with my own perspective of what is necessary to achieve the United Nations Sustainable Development Goals.

We cannot achieve this lofty goal of innovation in irrigation and water and sustainability through an engineering only approach. We must embrace the allied aspects of sustainable environmental management and societal behavioural change to enable our global irrigation communities to embrace the reforms necessary to make a difference and underpin a prosperous and inclusive society for all.

Historically, the irrigation sector has provided so much. It has delivered great engineering feats, tamed rivers, built dams and importantly has created food bowls from dustbowls by diverting our waterways for large and small-scale irrigation schemes.

* South Australian Water Ambassador, former South Australian Minister for Water Security, and Chair of the Australian National Water Commission

Together, we have been on a trajectory of continuous improvement since the beginning. Through flood to micro irrigation and everything in between, we have shown how efficient and productive water use can be.

But while we have achieved so much so far, the world still faces an extremely uncertain water and food future.

To illustrate:

- According to UNICEF[1] , four billion people, which is almost two thirds of the world's population, experience severe water scarcity for at least one month per year.
- Over two billion people live in countries where water supply is inadequate.
- Half of the world's population could be living in areas facing water scarcity by as early as 2025.
- Some seven hundred million people could be displaced by intense water scarcity by 2030.
- By 2040, roughly 1 in 4 children worldwide will be living in areas of extremely high water stress.
- 785 million people do not have access to clean safe water worldwide, and 84% of the people who do not have access to improved water, live in rural areas, where they live principally through subsistence agriculture.

These statistics are staggering and confronting!

So, in this context what does the future look like for the irrigation sector? What impact are we currently having and what can we do about it? How can water managers, governments, industry, researchers and others take on this immense challenge?

According to the International Water Management Institute[2], agriculture accounts for about 70% of global freshwater withdrawals, constantly competing with domestic, industrial, and environmental uses in scarce water supply conditions.

The extent of water scarcity is only going to be further exacerbated by climate change, but it is not just about global warming. Water pollution and declining quality is also a significant factor adding to water scarcity picture and it is important to recognise that agriculture is a big contributor here too.

Agriculture, including irrigation, consumes over 170 million metric tonnes of fertilizer[3] and 3.5 million tonnes of pesticides[4] each year, much of which finds its way back into our waterways.

The fungicides and pesticides we use and wastewater in our environment is contributing to the emergence of antimicrobial resistance in the environment. According to the World Health Organisation[5] the next big global health and food production catastrophe could be just around the corner if we don't address this global trend.

At this point, one could be forgiven for feeling overwhelmed by the complexity and multitude of the challenges at hand, however, address them we must.

1 https://www.unicef.org/wash/water-scarcity
2 https://thewaterproject.org/water-scarcity/water-scarcity-and-agriculture
3 https://ourworldindata.org/fertilizers
4 https://ourworldindata.org/pesticides
5 https://www.who.int/health-topics/antimicrobial-resistance

There are so many smart people in the world. Surely, we have the technology and the knowhow to fix this and adapt? Yet, here we are still seemingly tinkering around the edges while these existential challenges are accelerating towards us.

Why is it that the world is so slow to make progress at both global and local scales?

I have heard over and over again from learned people that we just need political will, leadership and money. Couple this with our traditional response to water security of more dams, pumps, pipes, concrete and the job should be done, right?

Wrong! It is much more complex than this.

What seems to be lacking is a connector between the problems and the on-ground solutions, with an associate absence of policy reform to accompany investment decisions.

Most governments around the globe have multiple agencies with touch points in water management.

Typically, there will be departments for agriculture, urban water, environment, ground water, surface water, water regulation and licensing, mining, public health and engineering, climate change - and the list goes on. These agencies have competing interests and agendas. They usually work in isolation resulting in ad hoc responses rather than whole of government multi-dimensional solutions.

Universities also segregate water related topics across a range of specialist faculties. Freshwater ecology, engineering, water policy and law, hydrology, water resources management and so forth.

The water industry also has a range of diverse technical expertise trying desperately to find the right door to open that will enable innovation to be adopted.

It is abundantly clear to me that the bottleneck preventing a cohesive response is in the siloed approach that the world has traditionally taken to tackling water problems. The complexity of the challenges we are facing cannot be solved unless we embrace a more collaborative approach across government, across industries, across researchers and critically, the involvement of the people for who water and food availability is a matter of survival.

Put simply, water now requires more than an engineering, economic and/or environmental approach. It needs a people approach!

We cannot hope to achieve better outcomes unless we start to think about these problems as societal problems that need much more than a unilateral, or even bilateral approach, or even multidisciplinary thinking. It requires a complex web of interactions and approaches across multiple portfolios and disciplines.

Yes – this is not going to be a linear journey. We must accept that we cannot just engineer our way out of this (apologies to my engineering friends in the audience).

The question remains however, who should be responsible for driving and enabling a new more collaborative approach to our water challenges right here, now and into the future?

- Is it Politicians?
- Is it Scientists?
- Is it Industry?
- Is it the community?
- Is it consumers?

Our politicians want to do good and they get voted back in if they do!

Our farmers want to be better at what they do, improving their land and reducing their ecological footprint while striving to make a profit.

Our communities do want a better future free of poverty with fair and equitable access to good clean water and sanitation.

Our local and municipal governments do want their cities and towns to be clean, green and supportive of healthy communities and individual well-being.

Our researchers do want to see their research applied to good evidence-based decision making.

Our water businesses do want to play a more active role through innovation and finding pathways to market for transformative technologies.

Our consumers do want a more sustainable world.

So how do we achieve greater collaboration and a shared sense of purpose across all of these groups. How do we engage more effectively across government, the private sector, communities and stakeholders to make things happen at the scale needed to achieve the United Nations Sustainable Development Goals?

It is time to shift to a people centric solution, but in doing so we must not underestimate how difficult this endeavour will be.

The experience here in Australia of Murray Darling Basin reforms is a great example of just how hard it is to do this.

I recently co-authored a paper for the Australian Water Partnership called 'Community Voices: An Australian Perspective on Community and Stakeholder Engagement.[6]' My fellow lead author, Leith Boully and I drew on the lived experience of people in Australia to explore what went well and what did not go so well, using two case studies - the process leading to the adoption of the Murray Darling Basin Plan and privatisation of local irrigation management schemes in Queensland.

The stories of 'Community Voices' in Australia to be published later this year, bring to the fore a people and community dimension that is rarely shared but is an incredibly important component of developing and implementing major changes to water policy. There have been successes and failures in Australia's journey that may be of value to those considering undertaking their own processes of water reform.

For the academics out there, this is not an academic paper, but rather a collection of stories from which the authors have drawn common themes and conclusions. There well maybe other views.

I would now like to explore what we observed.

The drive for reform usually comes from government or institutions with regulatory power and responsibility for water who are responding to scientific evidence of a problem and/or calls from stakeholders to address their concerns.

All sectors involved in complex policy reform areas like water, usually exhibit well entrenched patterns of behaviour.

6 Maywald K, Boully L, Campbell M, Day, Darryl – Community Voices: An Australian Perspective on Community and Stakeholder Engagement 2022

Politicians do not like bad news stories and can be overly focused on short term wins.

Government agencies covet the power of information and don't willingly or proactively share.

Public servants do not trust what communities will do with information and therefore do not readily involve them in problem definition or a co-design of solutions.

Scientists operate in lofty ecosystems, that do not accept contestability other than that of other learned colleagues.

The water sector talks intensely to itself and wonders why the rest of society just doesn't get it.

The stories gathered during interviews for 'Community Voices' with various stakeholders from multiple sectors have provided great insight into the common themes and frustrations incurred at many levels when endeavouring to bring a reform agenda to reality.

Six thematic areas emerged for this that Leith and I have distilled into six principles.

Key Principles

1. Leadership

It is critical to invest in creating leaderful communities and commit to inclusive, transparent, and well-resourced engagement with a wide range of stakeholders. UPFRONT! This is the beginning of the process not the end of it.

What is meant by Leaderful communities is that everyone involved has the opportunity to be heard, to listen and to play a part in the reform process in some way. Leadership comes from across a broad landscape of stakeholders with different perspectives, purposefully working to identify problems, find solutions and take action. No individual or institution has sole responsibility for leadership – it is a shared responsibility because water is essential to the lives and livelihoods of all.

Investment in leadership capabilities at the outset will be money well spent as communities and stakeholders work through the complex array of competing interests to reach agreement on the trade-offs necessary to achieve a sustainable future

2. Building Trusted Relationships

Provide a safe environment and take the time to build trusted relationships through exploration of values, culture, and conflict – people matter.

3. Clarity of Purpose

Provide clarity on the reform purpose, roles, responsibility, and accountabilities.

4. Problem Definition and Joint Discovery

Share power through knowledge exploration, problem definition and joint discovery of workable solutions.

A key to water reform is the quality of the science and other information that is used to substantiate the need for change. Stakeholders generally agree that water reform should be based on evidence. That evidence incudes science, observations, local and cultural knowledge, economics, and social impact

data. Reaching agreement on what knowledge or science is relevant and can be relied upon is a key factor early in the reform process discussion.

All science and knowledge can and should be contested to build confidence and to reach a baseline from which solutions can be developed and evaluated. Impenetrable or tainted science with personal bias will become evident, so it is best to have reliable sources identified early in the process.

Because most major water reform processes rely on hydrologic and hydraulic models, it is critical that stakeholders understand and have confidence in the quality of the data inputs and the model assumptions.

It is also critical that scientists providing information do not act as advocates for particular policy outcomes. Rather they should explain the science and be clear about what is not known as well as what is known. Otherwise, it is inevitable that conflict will arise over 'the science' and stakeholders will seek to source their own experts to confirm their bias or simply reject the reform efforts and disengage.

A process that clearly defines the problem and engages stakeholders in joint discovery will minimise science conflicts and ensure a sound baseline to measure progress during implementation. In addition, it is also important that stakeholders are involved in developing a monitoring and evaluation approach that will provide a feedback loop on the success or otherwise of the reform.

This is an iterative process and by paying attention to where stakeholders are in terms of moving through the change process, will allow for trust to be built and positive change to be achieved.

5. Time, Flexibility and Windows of Opportunity

Allow for flexibility in time and process. This type of reform can not be done in 5 minutes.

6. Decision Making and Change Management

Demonstrate how decision making and reform implementation reflects the outcomes of the engagement process.

There are many benefits of taking a principled approach to water. In 2004, another publication by Vanderbyl and Boully[7] explored these benefits and found that such a process allows a focus on whole of community outcomes and as a result most interests gain something from their participation, such as:

- The environment is better off
- There is a much more positive outlook for future processes
- Equity has been resolved between water users
- Small towns are better off because employment/business can be sustained and grow
- People are proud of what they have achieved
- There is a new interest and pride in the environment – it is no longer seen as 'a problem' or the 'enemy'
- Government is able to achieve public policy goals with the support of the community
- Science and scientists are now valued as a legitimate interest
- And for those who, despite the process, are still dissatisfied with the outcome there is an

7 Boully, L., B. McCollum, T. Vanderbyl and G. Claydon (2005). "Talk Until the Talking Starts: Resolving Conflict Through Dialogue". Paper presented at International Conference on Engaging Communities, Brisbane, 14-17 August.

opportunity to gather, and context for, dealing with evidence so that they can again argue their case during the life of the reform journey.

One other really important factor that goes to the heart of all the principles is that there will be conflict. It is unavoidable. You cannot push it under the mat and hope that it goes away. It is better to have the elephant in the room and deal with these issues constructively. The principles can provide the pathway to do this.

Real people in real communities come from different perspectives, with different values and expectations of what it is possible or desirable to do with water. They come as individuals with an expectation that they will be able to debate and negotiate outcomes that can satisfy their needs and often will have little or no understanding of the needs of others.

Because of the variety of stakeholders, conflict arises in many domains. It is important to recognise this conflict as an inherent part of the process and embraced it, not avoid it. A process that enables conflicted parties to come together in a non-threatening environment, to engage respectfully and develop their understanding will create the pathway toward mutual agreement and consensus on a negotiated outcome.

It is an unrealistic expectation that all parties will be happy with the outcome, but success is more likely if parties believe they have been given the opportunity to be heard, to participate in developing the solutions, and are permitted to be actively involved in the implementation, evaluation, and review processes.

Bringing people with divergent, conflicting views together to work out what is fair for everyone (including external stakeholders and future generations) is not something that is traditionally done well in water.

It is also likely that government stakeholders will be conflicted. Different government agencies have specific legislated responsibilities that can place them in conflict with each other. For example, an agency with responsibility for delivering growth in the agriculture sector may be conflicted with an agency with responsibility for sustaining the environment.

Professor Peter Cullen (dec) was a highly influential Australian scientist who had an ability to understand conflict and organise thinking around resolution of differences. His summation 'The Anatomy of Conflict'[8] describes well the types of conflict usually present when managing water.

Cullen said that there are five common elements in environmental conflicts.

"All elements may be observed in a particular dispute, or some may be more dominant than others. The different elements require different strategies to resolve them.[9]

1. Interest or Distributional Elements

Interest elements refer to the self-interests of the people involved. Players may be competing to exploit a resource for irrigating crops or for tourism. They have a personal financial involvement in the outcome and may believe that it is necessary to sacrifice the interests of others so their needs can be met. They may not even recognise the needs of others.

8 Cullen, Peter (2006) Science and Politics – Speaking Truth to Power North American Benthological Society Annual Conference Anchorage, Alaska, USA.

9 Cullen, Peter 1991.

2. Value Elements

Value elements involve more fundamental belief systems about the importance of things like our cultural responsibility for land, water and the plants and animals that depend upon them. Players need not have any personal involvement, nor even to know the area at all, to have a strong position on these values. People can co-exist with different values, but conflict arises when players feel that another set of values is foisted onto them.

3. Data Elements

Data elements arise when people lack the information to make wise decisions. They may be misinformed about likely outcomes or may disagree about what data are relevant. The relevant data may not exist, or they may be held by some of the players who decline to share them. Players may not trust the data provided by other players or may not accept the relevance of data that does not support their position. They may disagree on the appropriate techniques to analyse or interpret the data. The amount of water required to support the environment, and how it should be delivered to the environment are a classic situation where imperfect information makes resolution difficult.

4. Labelling Elements

Labelling elements enter a conflict when players label other players with negative labels that may introduce misconceptions and stereotypes. Greenies, dole bludgers and racist comments can all be used as pejorative terms to avoid listening to what the people are saying and responding to the substance of their concern.

5. Structural Elements

Structural elements are introduced by the organisational structure we erect to manage the resource. Conflicts between water agencies and environment protection agencies are one such example. Significant conflicts may occur between state and federal interests. These conflicts tend to be driven by forces outside the people in the actual dispute. The actual players may have limited authority to do other than represent their agency/state viewpoint.

6. Risk Elements

Humans have a range of approaches to risk. Some of us are cautious and averse to risk, others are much more prepared to take a chance in the hope of a big win and just hope that the risks are worth it"

Embracing conflict, accepting it as part of the process of water reform and actively planning to allow diverging views to be explored and contested is critical for forming sustainable solutions.

In the experience of the 'Community Voices' authors, stakeholders and communities will have a greater willingness to accept change if the reform principals adopted include embracing conflict and establishing processes that enable pathways toward negotiated resolutions that include them from the very beginning.

In addition to the six principles identified, we also highlighted a number of cornerstone ingredients for success:

- Make room for people in highly contested policy areas.
- Acknowledge science will inform but it is people who will collectively solve the problem.

- Create an engagement environment that enables people to shift from fear to trust. Using political or institutional power to dictate solutions may inflame long term conflict that can take generations to unpick.
- Know that evidence-based decision making is as much about the people as it is about the science.
- Do not rely on the biophysical sciences only. Include the economic and social sciences.
- Understand that the science, the values, the cultures, and the community needs are all critically important when engaging communities to achieve agreement on the trade-offs (and there will always be trade-offs).
- Develop solutions that clearly articulate trade-offs and impacts and how they are to be managed and mitigated.

History is littered with good intentions. I contest that this is because we have failed to approach the problem by taking into account the multidimensional aspects of the issues at hand and we do not willingly embrace fundamental people aspects. What is the point of building a toilet for a community that does not understand that their current ablution practices are causing a problem – it won't be used. What is the point of great big efficient channels or piped systems to deliver irrigation water if the farmers continue to use water inefficiently and are not prepared to pay for it appropriately?

It is evident that we cannot continue to take a linear approach to problem solving.

We must stop shrugging off engagement as a "soft skill" as it has historically been perceived. Experience shows us that it is perhaps the hardest skill of all.

The old model of get money, build it and they will come has failed us in the past and is not going to cut it in the future.

Our world is grappling with a multitude of colliding challenges.

Population growth and increasing urbanisation of society are ratcheting up the challenges of balance across the food, water and energy nexus. There will be more and more pressure on our limited freshwater resources with climate change only adding to this pressure.

However, the biggest risk for us all is human displacement due to water scarcity or extreme water events.

And as the industry that globally consumes about 70% of fresh water on the planet, I think the irrigation sector has a responsibility to do more.

What if we were to think about investments in water infrastructure as opportunities that not only improve water efficiency but can drive multiple reform agendas' including economic and social change?

We need to think about investments that link water reform with improving pathways to market, and new business models that improve productivity and profitability.

Improvements in irrigation, must also be linked to improvements to the ecosystem in which it operates.

I can almost hear the internal screams already – IT IS NOT MY JOB!!

This attitude must be reversed if we are to be successful.

In the developed world we have made huge headway in this respect through grand irrigation schemes and the uptake by farmers of new technology.

Here in Australia, we have taken great steps towards a sustainable future. We have invested heavily in irrigation infrastructure upgrades, water efficiency on farm and rebalancing consumptive take with environmental needs. This has not been without controversy which continues today, and we still have a way to go to be resilient in a future that is going to be much more unpredictable.

We have learnt just how hard it is to undertake broad sweeping reforms even in a wealthy country like Australia.

But what about the developing world where the water challenges are truly immense?

We cannot expect subsistence farmers to drive the kind of changes I am referring to without support from industry and government. We must rethink how we approach these challenges and bring all the stakeholders along on the journey, including our farmers, our customers, our investors and multiple government agencies. The current model isn't working fast enough. So, we are going to need to get better at listening to a wide range of challenging voices, learn how to stop, hear and consider those voices and adapt.

At the time our world needs us to be rowing in the same direction, we are watching the gap between the haves and the have nots grow exponentially.

So, the big question is what can you as individuals, and as a collective do about it.

Well, there are some positive signs but still more must be done.

Big business is starting to see the world through a corporate social responsibility lens, but we need much more leadership from industry if we are going to achieve the 2030 development goals. Government cannot do it alone and nor should we expect them too. Industry is much more agile and nimble and can provide much needed leadership in support of Government policy and investment.

You can individually re-visit your business model with a critical eye, and ask yourself where and how you could be working better with customers, competitors, governments and communities.

Then, finally, set yourself a big hairy audacious goal to better understand the problems you are endeavouring to address by daring to take a look through a bigger picture lens. You will be surprised at what you see, and then what you can do about it.

For the politicians in the room, I challenge you to be proactive in bringing the multiple agencies and sectors together for common purpose. Pool your resources, your aspirations and your political influence.

Don't continue to do what has always been done. Create pathways for the adoption of innovation, embrace all the sciences – technical, economic, environmental, and societal.

But above all, build capacity in your communities to empower citizens to be the driver of their better future.

Be part of the solution, not part of the problem!

Thank you.

24è Congres International des Irrigations et du Drainage

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Irrigation Australia Ltd.
Irrigation Australia's Committee on Irrigation and Drainage (IACID)
11/58 Metroplex Ave., Murarrie, QLD 4172
PO Box 13, Cannon Hill, 4170
Australia

T: +61 7 3517 4000
E: icid2022@irrigation.org.au, info@irrigation.org.au
W: www.irrigationaustralia.com.au

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ICID Central Office:
48 Nyaya Marg, Chanakyapuri, New Delhi 110 021, India
Tel : +91 11 2611 6837, +91 11 2611 5679, +91 11 2467 9532,
Fax : +91 11 2611 5962
E-mail : icid@icid.org, Website : http://www.icid.org

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