



## Submission No 6

### **Inquiry into Australia's Relations with the Republic of Korea; and Developments on the Korean Peninsula**

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Research Organisation

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Australia's Relations with the Republic of Korea  
Joint Standing Committee on Foreign Affairs, Defence and Trade

## CSIRO submission

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## Acronyms used

CSIRO	Commonwealth Scientific and Industrial Research Organisation
CRC	Co-operative Research Centre
DEST	Department of Education, Science and Training
ICT	Information and Communication Technology
ISL	International Science Linkages (Programme in DEST)
SWRRC	Sustainable Water Resources Research Centre (Korea)
KOWACO	Korean Water Corporation (South Korea)
eWater	eWater Cooperative Research Centre
DATAPCS	A Korean Small to Medium Enterprise (SME) specialising in wireless internet data acquisition
MOST	Ministry of Science and Technology (South Korea)
MOCT	Ministry of Construction and Transport (South Korea)
MOU	Memorandum of Understanding
NGO	Non-Government Organisation
WROC	Water Resources Operation Centre (South Korea)
WRON	Water Resources Observation Network (Australia)



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### Scope

This submission comments on recent developments in water resources management and related research and development in South Korea. It is argued that these developments present opportunities for Australian water management agencies, consulting firms and R&D institutions to tap into a progressive market segment characterised by significant public and private sector spending and rapid innovation.

This submission is based on observations made by the author during five visits to South Korea since 1998, and reciprocal visits to Australia by South Koreans from various universities and private firms. In October 2004 the author led an Australian 'Water Resources Science and Technology Mission to South Korea', supported by DEST's International Science Linkages (ISL) Programme. Some comments are made on the value of the ISL Programme and DEST's bilateral relationship with South Korea.

### Submission

As other submissions to this inquiry will surely testify, South Korea has undergone remarkable modernisation since the Korean War ended in the mid-1950s. Since the 1970s in particular, South Korea has transformed itself from a poor agrarian economy to a dynamic industrial and technological powerhouse. Ship-building, automotive industries and electronics are some of the big success stories underpinning South Korea's recent development. Now, biotechnology, ICT and nanotechnology are on the rise in South Korea with some early breakthroughs now positioning the country on the world stage in these domains. This stellar growth has required more intensive use of natural resources, particularly water, and has impacted negatively on air and water quality. As living standards have improved, so too have community expectations of the quality of these natural resources.

Like Australia, South Korea is now grappling with a serious water crisis, owing to population growth, per capita increases in water consumption, climate change and pollution of the water resource base. The Korean Water Corporation (KOWACO) estimates that South Korea will require a further 1.8 billion cubic metres of water by 2011. Already, communities in remote mountain villages and

islands face acute water shortages at certain times of year, but it is expected that South Korea's stellar development will stall unless new sources of water (or water savings) can be found.

Another key trend in South Korea is the emergence of a vigorous sustainability agenda being advocated by NGOs and now the broader community. In the water management domain, there are increasing demands for the provision of environmental flows to rivers and for the clean-up of polluted lakes, rivers, estuaries and aquifers. This is putting additional downward pressure on water availability for consumptive purposes.

Finally, South Korea has had to cope with several extreme floods over the last decade which has caused a significant upward revision in the assumed 'possible maximum flood'; the key design criteria for sizing dam spillways to assure public safety. The consequence of this is an expensive future program of spillway upgrades for major dams such as Korea's largest, the Soyang Dam.

In response to these trends, the South Korean government has recently decided to make a major investment in water-related research and development (R&D). This has been achieved primarily through the establishment of the 'Sustainable Water Resources Research Centre (SWRRC)', supported under the 21<sup>st</sup> Century Frontier R&D Program with co-funding from the Ministry of Science and Technology (MOST) and the Ministry of Construction and Transport (MOCT). Set up somewhat like an Australian Cooperative Research Centre, the SWRRC will be funded for a ten-year period (2001-2011) with a total budget of about US\$125 million.

The objective of the SWRRC is to develop knowledge and technologies to augment South Korea's water resource by a further 3 billion cubic metres by 2011. Key to this ambitious challenge will be the development and implementation of an integrated water resources management system. This will comprise advanced data monitoring and capture technologies, linked to a state-of-the-art forecasting system. In addition to developing these core technologies, South Korea is also investing heavily in capacity building. Over its life, the SWRRC will fund several hundred graduate students, mostly at Ph.D level, with the aim of greatly enhancing the skill base of the water resources management sector.



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On top of this massive investment in water R&D, the South Korean government is making significant investments in water infrastructure. These investments include major outlays on river restoration works, dam spillway upgrades, aquifer remediation schemes and catchment works aimed at improving water quality.

At the present time, South Korea has exceptional skills in water engineering and ICT, and is using these to good effect. For instance, almost all of the hydrometric data network in South Korea is monitored remotely in real-time via a pervasive wireless network, supplemented by satellite-based communication networks. Australia is years behind them in this area. On the other hand, the South Koreans have less-developed capacity in water-related public policy development, water ecosystem understanding, catchment modelling and stakeholder participation processes. These are all areas where Australia is regarded as a world leader and could ably assist South Korea.

The recent DEST-funded Australian 'Water Resources Science and Technology Mission to South Korea' revealed the synergies that could be captured by Australian and South Korean water sector professionals cooperating on water-related R&D. Australia could benefit by inducting some of the water engineering and ICT expertise being applied in the water sector in South Korea. A tremendous example of South Korean innovation in this domain can be found at the 'Water Resources Operations Centre' (WROC) operated by KOWACO in Daegu. This state-of-the-art facility is used to monitor water resources across the country and manage floods, allocations of water to consumptive uses, and to optimise hydropower generation. The WROC is part control centre and part education facility, and sets a compelling example for the Australian water industry to follow.

Engineers from KOWACO have recently visited CSIRO to help us conceptualise a 'Water Resources Observation Network' (WRON), a variant of the South Korean WROC. The Australian WRON is currently being scoped under the auspices of the Water for a Healthy Country Flagship Program and involving input from CSIRO, the Bureau of Rural Sciences, Geoscience Australia, the Bureau of Meteorology and the eWater CRC. Australian engineers and researchers will shortly return to South Korea to learn more

about the WROC to further the design process for the Australian WRON.

As noted above, we have much relevant expertise to offer the South Koreans in exchange for their contributions to our own R&D effort. As water becomes a scarce resource in South Korea and the community demand for healthier waterways intensifies, they will require more catchment modelling capability, ecosystem understanding and public policy skills. Australian researchers and practitioners are well positioned to provide this expertise.

The 'Water Resources Science and Technology Mission to South Korea' also revealed the significant potential for Australian water engineering firms to team-up with South Korean partners in consulting work in south-east and north-east Asia, particularly in China where water management challenges are also vast. Similarly, there are great opportunities for South Korean and Australian SMEs to team up on technology development. Already as a result of the DEST-funded mission, Tjurunga Pty Ltd (Australia) and DataPCS (South Korea) are collaborating on the use of wireless internet data acquisition technologies in the water sector.

Recognising the value of collaboration on water R&D, CSIRO has entered into Memoranda of Understanding (MOUs) with SWRRC and the Korean Water Corporation (KOWACO). Researchers from all three agencies are now planning collaborative R&D projects but are constrained by the absence of a funding source to sustain collaboration beyond their own shores. Water engineering firms and small to medium size enterprises (SMEs) will face similar challenges and are likely to be risk averse towards brokering relationships with offshore partners, despite the potential of eventual commercial success. A modest government-based innovation fund designed to help carry this risk is likely to be very effective in stimulating these linkages. The current funding programs available in Australia are excellent for initiating contact between the two countries but insufficient to sustain deeper collaboration.

We note that DEST is currently reviewing the bilateral science and technology agreement between Australia and South Korea, and is considering re-energising this with a new focus. We



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propose that water-related science and technology would be a very worthwhile focus to emphasise in any new bilateral agreement and certain to be actively supported by researchers, practitioners and SMEs from both countries.

CSIRO and the eWater CRC stand ready to assist DEST and the Australian government in general in deepening our science and technology relationship with South Korea. High-level contacts with South Korean water research institutes and water management agencies are already in place, as is a mutual enthusiasm to collaborate. As noted above, we feel there are great synergies to be captured by working cooperatively in our shared quest to improve the security and quality of water supply in our countries.

### Conclusion

The key points from this submission are as follows:

- South Korea has undergone stellar economic and technological development over the last three decades.
  - Like Australia, South Korea is starting to grapple with a severe water crisis that threatens to stall future economic development and create social discord.
  - The South Korean response to this dilemma has been to invest heavily in water-related science and technology and the establishment of new water infrastructure.
  - Australia can benefit from the application of South Korean water engineering and ICT know-how applied to the water sector.
  - South Korea can benefit from the application of Australian catchment modelling expertise, ecosystem understanding and water-related public policy expertise.
  - Over the last two years, Australian and South Korean water research institutes and water management agencies have become well-connected and now wish to collaborate more deeply.
  - Establishment of a significant bilateral innovation fund would greatly assist the two countries to work together on water projects of mutual benefit.
- CSIRO and the eWater CRC are eager to work with the Australian and South Korean governments to establish such an innovation fund.
  - It is anticipated that active collaboration on water R&D would provide a springboard for commercial partnerships in water engineering and SME-based water-related technology development.