CRC for
Water Sensitive Cities

2015/16

Stakeholder
Annual Report

Australian Government
Department of Industry, Innovation and Science

Business Cooperative Research Centres Programme

CRC for Water Sensitive Cities
Annual Report 2015/16

Publisher

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Date of publication: February 2017

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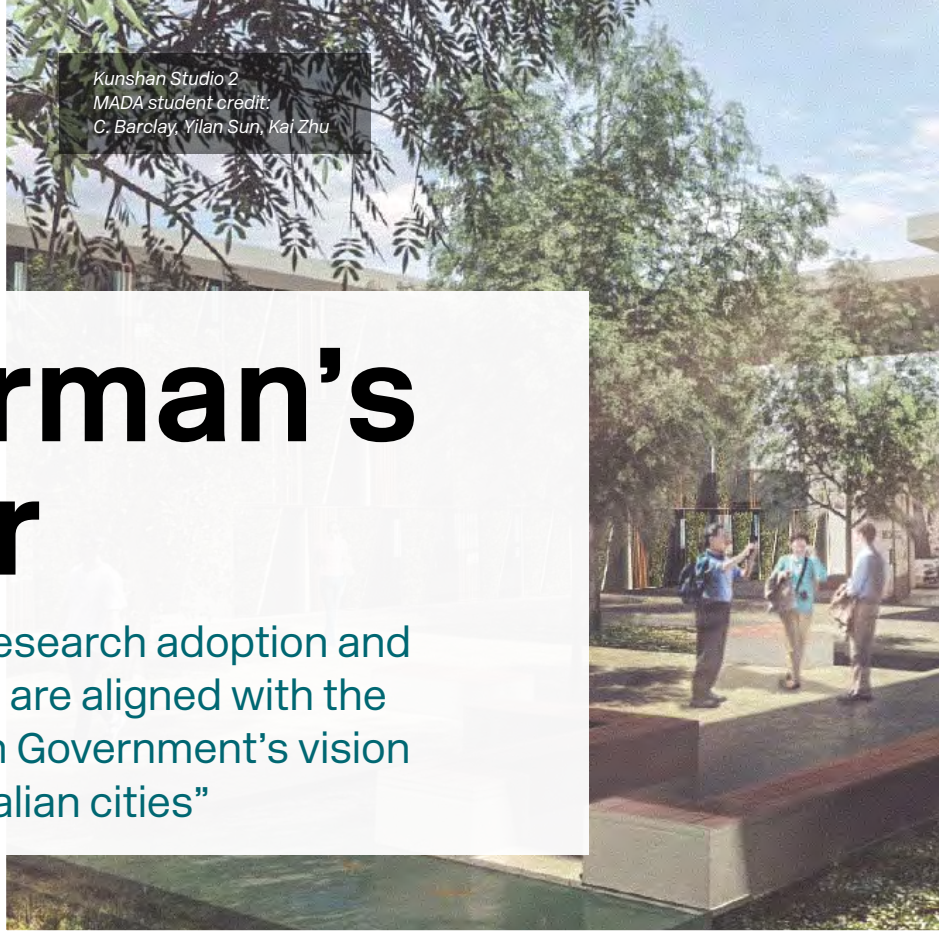

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Chairman's letter

"Our plans for research adoption and tangible impact are aligned with the Commonwealth Government's vision for smart Australian cities"

FY1516 has been a year of transition and planning for the Cooperative Research Centre for Water Sensitive Cities (CRCWSC). As we approach the end of our Tranche 1 program (2012–2016), we find ourselves at an important strategic juncture. After investing and delivering our first four years of research, we now embark on the potentially more challenging task of achieving impact from this research. But we are more than equipped to meet this challenge. Our efforts to create connections over the last four years mean that we will be building on a solid foundation – our strong network of partners, our reach across Australia's major cities, and our cross-disciplinary links within industry and within research.

Our plans for research adoption and tangible impact are aligned with the Commonwealth Government's vision for smart Australian cities: transitioning them from the old manufacturing-based economies to new innovation and service-based economies.

These cities must be resilient, sustainable, and liveable – all attributes that we ascribe to water sensitive cities. In FY1516 we developed a structure and program of activities to ensure that our direction continues to align with and support that of the government and our partners.

The Board has also defined a bold international direction for the CRCWSC going forward. While our priority remains the transition of Australian cities and towns, we also recognise the unique leadership position of Australia's water industry – and with the CRCWSC's strong international reputation, many global cities now look to us for direction. Working in international cities provides an opportunity to create a global brand for water sensitive cities, as well as important business development opportunities for our commercial partners. It also allows us to establish pilot projects overseas that implement the technologies we anticipate being applied in Australian cities in the not too distant future.

After a productive year, we remain on track to deliver our commitments to the Commonwealth and to our members. Our efforts over the past four years are bearing fruit, and the foundations are in place for the next exciting phase of the CRCWSC.

Cheryl Batagol
Chairman

CEO's letter

"We are committed to moving beyond discovery research by developing innovative and tangible tools that fill gaps in current industry practices."

With a range of strong outcomes delivered, FY1516 has once again been a very successful year for the CRCWSC.

The CRCWSC continued to influence policies that shape the development of our cities. We contributed significantly to the development of the urban water management component of the Victorian Government's Water for Victoria policy. The Water Sensitive Cities Framework has been extensively adopted by many international government and multi-lateral agencies, notably the Asian Development Bank. We strongly believe that the transition to becoming a Water Sensitive City can be both top-down and bottom-up, and we are including both pathways in our research impact strategy. The top-down approach begins by creating the policy environment for Water Sensitive Urban Design technologies, and we are already seeing this happen with the guidance of our research knowledge. We are also seeing the bottom-up approach take place as the CRCWSC continues to be called on as a trusted advisor by governments, utilities and communities in Australia and overseas.

We are committed to moving beyond discovery research by developing innovative and tangible tools that fill gaps in current industry practices. For example, our Water Sensitive Cities Index emerged as an early flagship product from our research. This tool is designed to benchmark and rank a city's water sensitivity performance to support development strategies and their implementation. It addresses a gap for cities wishing to assess their water sensitive performance. In FY1516, this tool advanced to the trial phase.

In FY1516, we expanded our reach to a number of international cities, and there is growing international interest in our research and capabilities. We had a strong on-ground presence in China during the year and also hosted delegations from California, Chinese cities, and the Technical University of Denmark. Our particular focus has been on China, where there are opportunities to rapidly implement a number of CRCWSC research outcomes and to learn from these pilot schemes. This international engagement compliments our work in Australian cities by providing proof of concept of these new approaches, and by building recognition for our innovations within international water and development sectors as the new best practice.

Our priority throughout the year has been preparing for the next phase of the CRCWSC. We began the CRCWSC on 1 July 2012, with research projects underway from the outset. The first four years focused on discovery, but we have also made great efforts to lay adoption pathways for the research outputs, insights, and recommendations that have been created. This year, with the transition from Tranche 1 to Tranche 2 projects at the forefront of our minds, we have engaged widely and deeply with our partners and their stakeholders. The response has been wonderful, with support that reinforces the relevance and importance of water sensitive cities. Many individuals have invested considerable time and energy in developing the scope of Tranche 2 projects, and in re-crafting the operational structure of the CRCWSC to ensure we successfully deliver outcomes. Our efforts in FY1516 mean that we are well placed to start delivering our Tranche 2 projects in FY1617, providing a seamless transition into this new phase. The results will be world-class integrated research and research adoption that will leave a legacy in cities and towns across Australia and beyond.

Professor Tony Wong
Chief Executive

About CRCWSC

FY1516 has once again been a very successful year for the CRC for Water Sensitive Cites.

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) was established in July 2012 to help change the way we design, build, and manage our cities and towns by valuing the contribution water makes to economic development and growth, our quality of life, and the ecosystems of which cities are a part.

The CRCWSC is an Australian research centre that brings together many disciplines, world-renowned subject matter experts, and industry thought-leaders who want to revolutionise urban water management in Australia and overseas.

Why do we need water sensitive cities?

We exist to meet three challenges that critically affect cities and towns in Australia and across the world:

- Population growth and changes in lifestyle and values
- Climate change and climatic variability
- Challenging economic conditions.

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MADA students credit:
M. Hurst, J. Pitts, T. Shallue, Y. Wang

Our vision

We envision future cities and towns – and their regions – as sustainable, resilient, productive, and liveable.

To deliver this, we:

research and develop world-class science, technology, innovation, and design;

synthesise knowledge across disciplines, in collaboration with our industry partners; and

influence, lead, empower, and partner with stakeholders across all sectors.

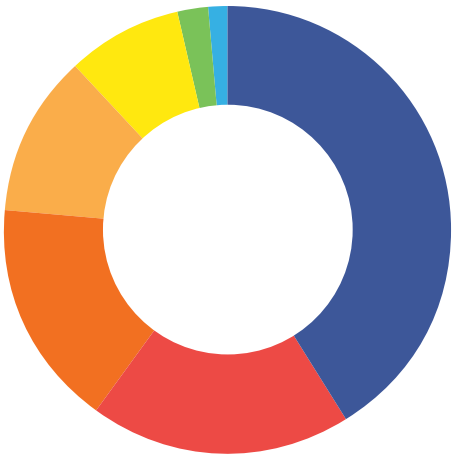
"We envision future cities and towns – and their regions – as sustainable, resilient, productive, and liveable"

Our partners

CRCWSC partners share the passion and commitment for creating water sensitive cities (WSC). One of the many strengths of the CRCWSC is the large number of organisations that have invested not only in the development of solutions but in the application and utilisation of the solutions to effect positive change in the real world.

The CRCWSC has a diverse number of research and industry-based funding partners or participants.

Our organisational sectors



- 35 Local government
- 16 State government department or agencies
- 14 Private companies
- 10 Research organisation or university
- 7 Water utility or corporations
- 2 NGO or NFP organisations
- 1 Community groups

Our research focus 2012—2016

Today, many towns and cities face challenges, lack the necessary tools, and encounter knowledge gaps that prevent them from being more water sensitive.

Our role at the CRCWSC is to provide these tools and to address these knowledge gaps, with the help of researchers from over 20 different disciplines at a range of national and international universities, research centres, government organisations, and private industries.

In our first four years (Tranche 1: 2012–2016), we sought answers to some big questions:

- How do our culture, institutions, and human systems affect the adoption of new ideas and innovations?
- How will changes in our natural environment impact on and affect how we plan and build our cities?
- What technologies and information are needed to support delivery of water sensitive cities?
- What are the range and appropriate mix of interventions to translate research and knowledge into practice?

We have been answering these questions through 34 research projects arranged within four programs:

Society (Program A):

Delivering social change

Water sensitive urbanism (Program B):

Influencing urban planning and design through water

Future technologies (Program C):

Integrated and multifunctional urban water systems

Adoption pathways (Program D):

Building the capacity to innovate and transition

Kunshan Studio 2
MADA students credit:
B. Lok Ok Choo, S. Wakhlu, N. Shen, L. Gausachs

"We have 34 research projects across 4 programs"

Creating impact from our research

We want our research from the last four years to have a tangible impact.

To achieve this goal, we are focusing on four areas of impact aimed primarily at state and local government (including water corporations), private industry, and – by extension – the broader community:

1. Aligning policy to a water sensitive vision

To enable the transition to water sensitive cities, policies and strategies should be aligned to a water sensitive vision. They should coordinate effectively between sectors and levels of government and determine how water sensitive goals should be achieved.

2. Engaging communities to empower citizens

To enable the transition to water sensitive cities, citizens should be treated as partners in decision-making, and their meaningful involvement and empowerment should be actively pursued.

3. Integrating water systems planning with land use planning

To enable the transition to water sensitive cities, water systems planning should be cross-sectoral and integrated with urban and land use planning.

4. Using shared frameworks in benchmarking and decision-making

The strategy to deliver a water sensitive city should be underpinned by agreed upon goals across urban planning and water systems design to enable integrated water solutions.

2015/16 highlights

With many of our first tranche research projects finishing, we increased focus on creating impact from our research findings.

July 2015

Aug

The CRCWSC's annual PhD Retreat – focusing on science communication, networking, and mentoring – is attended by 49 students, VIC

Sep

CRCWSC research picks up a Stormwater Victoria Award for Excellence and an Australian Water Association (QLD) Award for Research Innovation

The prestigious journal *Nature* publishes an invited paper on interdisciplinary research by CRCWSC Professors Brown, Deletic, and Wong

235 delegates attend our 2nd Water Sensitive Cities Conference, Brisbane

Oct

Our *Shaping Perth as a Water Sensitive City* report is published

Needs and Opportunities Workshops are held in five cities to gain insights for shaping Tranche 2 (2017–2021) research

Nov

Dec

CRCWSC Professor Darryl Low Choy is named a Fellow of the Planning Institute of Australia

Our *Towards a Water Sensitive Elwood* report is published

Following extensive end-use consultation across 5 cities, our first Tranche 2 Project Development Workshop in Melbourne is a success

Our success during the year built on the recognition received by our researchers and the growing national and international interest in our research. We maintained the strength of our partnerships with end users, and expanded into new regions of Australia. We saw the emergence of a number of flagship products that will improve the way we manage water in our cities, and realised this during the year through policy influence.

By the numbers

COMMONWEALTH MILESTONES

63/70

milestones achieved
with **5** delayed (by no more than a year) and **2** requiring variation to the Commonwealth Agreement

RESEARCH OUTCOMES

150

research outputs
will be produced from these projects

PROJECT PROGRESS

We completed about half of the

2012–2016

research projects during **FY1516**, most others to be completed in **FY1617**

RESEARCH COLLABORATION

28/32

current research projects
involve researchers from at least **2** participant organisations; **3** involve four or more organisations

PhDs

67

PhD candidates

STAKEHOLDER ENGAGEMENT 1

1514

stakeholders
attended a CRCWSC event this year

STAKEHOLDER ENGAGEMENT 2

235

delegates
attended the WSC Conference in Brisbane

STAKEHOLDER ENGAGEMENT 3

CRCWSC researchers participated in approximately **54** national and international workshops and conferences hosted by participants and other organisations, collectively reaching an audience of over

3700 people

STAKEHOLDER ENGAGEMENT 4

450

delegates
at the China—Australia Water Sensitive Cities Summit in Kunshan

STAKEHOLDER ENGAGEMENT 5

180

attendees
participated in our Tranche 2 planning workshops, covering 58 individual CRCWSC participant organisations, plus 58 other (non-participant) stakeholder organisations

Taking stock: Tranche 1 programs

Program A — Society

Of the 12 projects in this program, 5 were completed in FY1516 and delivered their final project milestones. The remaining 7 have either been extended or integrated into Tranche 2 (FY1617—FY2021).

Economic valuation:

Comparing and optimising water supply alternatives, valuing unpriced social and environmental outcomes, and comparing potential water sensitive projects and investments revealed that there are substantial economic benefits in pursuing a WSC. Our survey found Australian households are willing to pay more for liveability benefits such as freedom from water restrictions ($118-$218/household/year), improved stream health ($104-$278/household/year) and reduced summer peak temperature ($47-$81/household/year).

Investing in green infrastructure in urban areas was also found to be beneficial as people are generally willing to pay more for properties within these areas. For example, buyers will pay an additional $36,0000-$54,000 per property in streets that feature raingardens, or $17,000-$26,000 for properties close to a restored natural waterway.

Engaging communities and changing behaviours:

Our survey of over 5000 Australians identified five profiles of how engaged people are with water-related issues. The survey showed that community understanding of water-related terms is highly varied, and many terms regularly used by professionals are not understood by the community. With the demographic and psychosocial profiles of each group, we can develop targeted initiatives to improve engagement in water-related issues. To identify and prioritise which behaviours to target, we have developed an Impact Likelihood Matrix that maps behaviours according to their impact and how likely they are to be adopted (e.g. which behaviours are both high impact and high likelihood). We also found that domestic water cultures differ across Melbourne, Perth, and Brisbane – despite all three cities experiencing drought or severe water shortages in recent years. This points to the need for city-specific policies and interventions to ensure durable change.

Kunshan Studio 2 MADA students credit: S. Cudlipp, I. Geng, A. Williams

Institutional change:

Social transformations also require reform and innovation at the institutional level. To facilitate the uptake of the latest research into policy and practice, we looked for ways to improve the interface between science and policy. To date there has been little training available for researchers wishing to engage with policy makers. To address this gap we developed practical advice and experiential training using a 'mock Cabinet' process in which researchers presented a case for policy change and received feedback from former ministers and policy bureaucrats. This experience was complemented by media interview training to help researchers identify their key messages.

Innovators must also overcome institutional barriers. We have identified a number of good projects that failed in the early stages because insufficient attention was given to engaging with key stakeholders who needed to jointly 'own' the solution in the long term. In response, we developed a framework of strategies that help practitioners achieve progress through innovation.

Our research also shows that legal frameworks are beginning to lag behind the rise in the use of decentralised water management systems in cities. During the year we developed new policy options for reallocating risk associated with these systems, including better harm prevention, reallocating liabilities for harm and developing informal recovery mechanisms. Regulators wishing to develop legal and regulatory frameworks that allow innovation to occur in socially and commercially optimal ways can now consider these options.

Facilitating city transformations:

For CRCWSC research insights, recommendations, and integration to have maximum impact in advancing a city's transition, they must be aligned through strategic transition planning. To assist strategic planners and policy makers in this process we developed a number of new transition planning processes and decision-support tools during the year. These include the Transitions Dynamics Framework and accompanying user manual that provides practical guidance on how to create the social and institutional conditions needed to enable a city's transition toward its desired water future. Having a shared vision and narrative is one of these conditions, and we advanced our city-scale envisioning process during the year to allow it to be easily repeated in other cities. Development of the DAnCE4Water (Dynamic Adaptation for enabling City Evolution for Water) decision support tool also continued. This tool helps consultancies, utilities, government agencies, local councils and research institutes collaboratively identify water management solutions by testing their robustness under a range of future scenarios.

Program B — Water sensitive urbanism

Of the 8 projects in this program, 2 are complete, 4 are nearing completion, and a further 2 are continuing in Tranche 2.

Catchment-scale landscape planning for Water Sensitive Cities in an age of climate change:

We have connected the Urban Metabolism Evaluation Framework for Water to policy and planning. This framework was tested at a number of urban scales, and data is being collected to create a baseline evaluation of Brisbane, Melbourne, and Perth. We liaised with the stakeholders in each city-region through its Project Reference Groups and conducted scenario-planning workshops with each, from which six scenario narratives are being prepared for future evaluation of policy options.

Impacts of climate change on rainfall extremes and drainage:

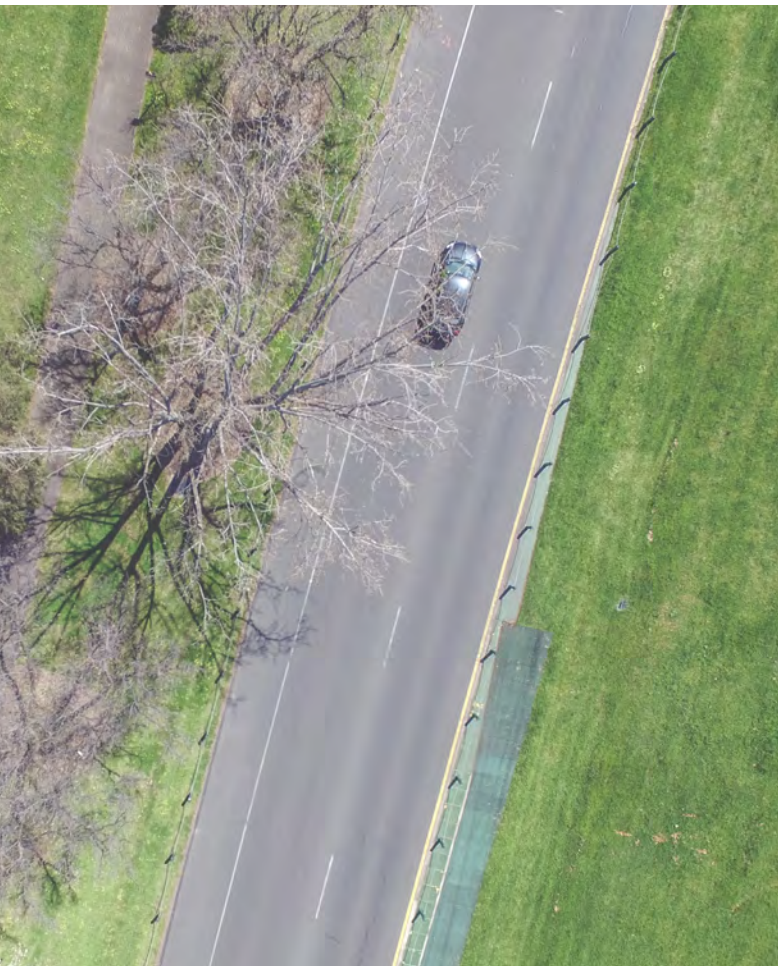
This project has been completed. The CRCWSC developed a model to simulate high-resolution rainfall statistics using available radar data. This also helps us create high-resolution scenarios for future rainfall. With co-funding with the Centre for Climate Research Singapore, we applied the model to tropical regions and determined daily rainfall projections. Our Singapore-based participant, Tropical Marine Science Institute at the National University of Singapore, used the model to generate simulations at 1 km and 5 minute resolutions for each projection. This data was then used to generate Intensity-Duration-Frequency curves for Singapore that will aid in designing and upgrading flood-resilient infrastructure.

Hydrology and nutrient transport processes in groundwater/surface water systems:

We are continuing to explore relationships between dissolved organic nitrogen and land use, catchment characteristics, nutrient concentration, and season. Our findings are being consolidating into two industry reports: one on the Glades case study, and another outlining monitoring approaches for WSUD elements impacted by high groundwater.

The design of the public realm to enhance urban microclimates:

This project has focused on model development and verification/validation and scenario modelling. The research has shown the significant atmospheric cooling benefits for Australian cities of vegetation, especially when supported by irrigation. It has also shown there are cooling benefits at a range of different scales: single WSD features (ie at household scale) can reduce temperatures by 0.6-1.2°C; an urban park can reduce temperatures by 1-2°C and street scale installations can provide cooling of up to 0.9°C. When applied at a neighbourhood scale, the cooling from widespread WSUD can be 3-5°C. During the year we used this understanding to help Melbourne Water develop research activities that show the cooling benefits associated with its land holdings.



Protection and restoration of urban freshwater ecosystems: informing management and planning

We are now conducting advanced analysis of the results of our field sampling – undertaken with support from Biometric Research. We are also developing a new Urban Restoration Framework that can be used in Tranche 2. We have undertaken our final field trip to Anvil Way, and are completing the chemical analysis of the samples. Data analysis is also in progress.

Flood resilience: integrated flood risk modelling for better urban design and planning

This project is almost complete, and we have been reporting and disseminating the research findings. Results of the Perth case study and Scotchman's Creek (Melbourne) case study were collated into two journal articles. Preliminary findings from the Elwood (Melbourne) case study were presented at several international conferences, a Melbourne Master Class Workshop, and an interactive exhibit that sparked interest outside the CRCWSC. A working group of senior representatives from the five key stakeholder organisations in Elwood (three local councils and two water utilities) is being established to advance the work.

Flood resilience: adaptation related decision making

This project is progressing with its European and Australian case studies examining the appropriate balance between the social and technical dimensions of flood resilience by continuing a range of flood modelling approaches. We completed an independent peer review and revised the project's industry engagement plans, with agreed workshops during the year in Melbourne, Adelaide, and Brisbane. We held numerous meetings with stakeholders about the various case studies and deliverables.

Statutory planning for Water Sensitive Urban Design:

We have completed our review of statutory regulation and planning and policies in VIC, WA and QLD to gain a persepctive on current pathways for adoption of water sensitive practices. We have engaged with Water Sensitive SA, which is interested in utilising findings from the literature review to influence planning policy changes. Presentations were made at various seminars and conferences, including a meeting with the City of Manningham and Melbourne Water. The team has engaged with the Victorian Department of Environment, Land, Water and Planning regarding the Water for Victoria policy.

Program C — Future technologies

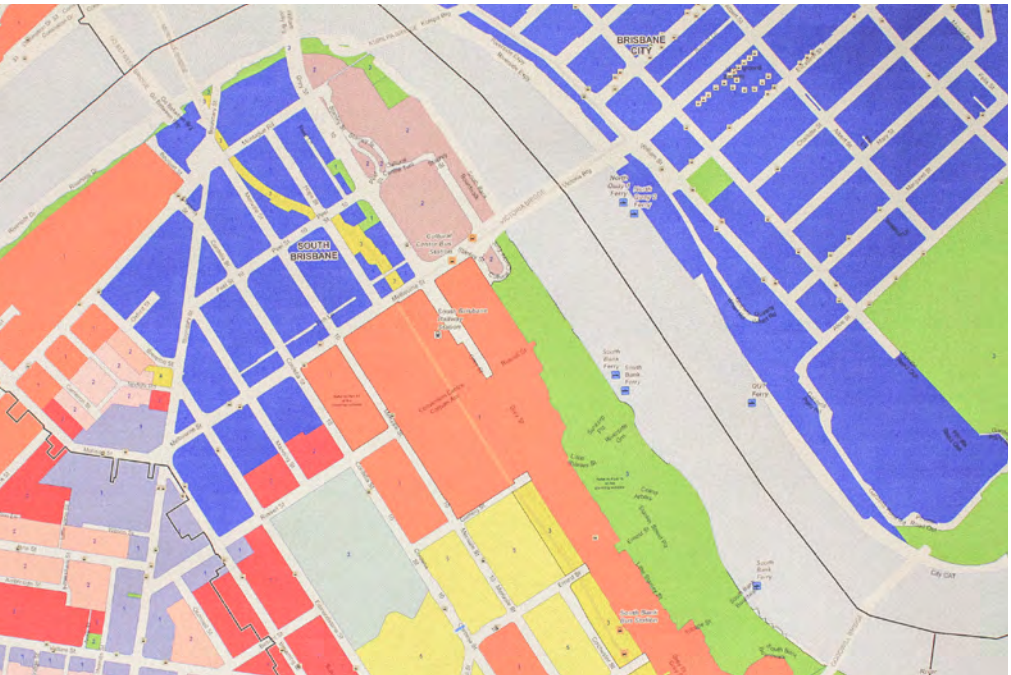
Program C projects are progressing, with several nearing completion.

Risk and health: Understanding stormwater quality hazards:

This project is nearing completion, and we are preparing final stormwater characterisation reports that will support catchment landuse prioritisation for urban stormwater harvesting and treatment standards.

Fit-for-purpose water production:

PhD student Elisabet Andreas Garcia won the Distinguished Award from Singapore's Agency for Science, Technology, and Research for her work on the effectiveness of a new electrochemical oxidation system for disinfecting greywater. Greywater and stormwater treatment technology reviews were drafted, and laboratory-scale hybrid biofilters were "challenged" with greywater and stormwater. This project will extend into FY1617 to allow for a 3-year PhD program and to ensure milestones are delivered.



Integrated multi-functional urban water systems:

We communicated research findings from this project widely during the year at workshops, field visits, and in discussions with practitioners directly involved in operating and maintaining stormwater treatment systems. We progressed the design and planning of the green wall field trial for Bentley in Perth, and the hybrid biofilter for the village of Jiandong in China. The team continues to work closely with Monash City Council in designing, constructing, and performance monitoring biofilters installed at the Eastern Innovation Centre.

Intelligent urban water systems:

Significant uptake of outputs from this project continues. We are providing handover and training for Orange City Council representatives on software for optimising pump operations. Three industry participants were involved in pilot studies using new analytics techniques and visualisation software for smart metering data sets: City of Canning Council (Leisure Centre water meters), Perth Zoo (meter data), and South East Water Victoria (Melbourne apartment data).

Resource recovery from wastewater:

We have constructed a phototrophic purple bacteria membrane bioreactor pilot plant at the Queensland Urban Utilities/University of Queensland Innovation Centre. We have engaged the Department of Agriculture, Australian Pork Limited, and Australian Meat Processors Corporation to extend this technology.

Managing interactions between decentralised and centralised water systems:

A model has been built for the sewer section connecting the Fisherman's Bend development area to Melbourne Water's Western Treatment Plant. We completed the national survey on risks to long-term viability of residential recycled water schemes, and started a risk assessment and management plan. We began experiments of reduced-flow scenarios at the sewer pilot plant (constructed in FY1415 at the QUU/UQ Innovation Centre).

Program D — Adoption pathways

This program had 6 active projects in FY1516: 2 were completed and the remainder are continuing in Tranche 2.

Learning through integration and demonstration:

This new project was approved by the Board in FY1516. It continues from the project "Integration and demonstration through urban design" which finished in FY1415. With an industry-based Project Leader, it focuses on ensuring lessons from past attempts to deliver water sensitive cities are captured, analysed, and shared with others. It will also identify new demonstration projects.

Water Sensitive Cities Toolkit:

The Toolkit simulates stormwater generation under a range of future climate scenarios, stormwater pollution and peak flow management using green infrastructure, stream ecological health and urban microclimate outcomes. It is rapidly finding relevance and application in industry, helping us communicate and utilise the benefits of various water management scenarios in urban precincts. CRCWSC industry participants, primarily from small to medium enterprise associates, have been using the tool in a number of case studies in SA and VIC. It has also been used in several CRCWSC Research Synthesis Workshops.

Strengthening educational programs to foster future Water Sensitive Cities leaders:

This project is now complete, and we delivered a range of educational programs to build the knowledge and skills needed to develop water sensitive cities. Postgraduate modules continued to be delivered in Australia by the International WaterCentre's (IWC) Masters of Integrated Water Management (MIWM), and implementation commenced in Europe through UNESCO-IHE. A new Innovation Skill Series aimed at practitioners was developed, with the curriculum finalised for a new program on "Building a business case for Water Sensitive City projects and programs". The course incorporates research from Program A as well as from Research Synthesis Workshops, along with background intellectual property and new syllabus development. The IWC Masters "Urban Water Futures" module designed and delivered through this project won an Education Excellence Award from Stormwater Queensland.

Urban intensification and green infrastructure:

We have been working on precinct-scale projects to demonstrate design processes that prioritise water issues when addressing urban intensification and climate change. The focus is on context-specific, integrated, and water sensitive outcomes. We used participatory processes to transfer knowledge and garner understanding of context, complexities, and uncertainty with a variety of stakeholders. We are developing a design manual of strategies and guidance for industry to install water sensitive places tailored to differing contexts and scales. Case study projects are underway in WA, QLD and VIC.

Development of an evaluation and learning framework to inform CRCWSC impact assessment:

This project has been completed and has made a significant contribution to the way we garner insights on the short, medium, and long term influence of our research. The evaluation framework will be embedded within our organisational processes in Tranche 2.

Water Sensitive Cities Index:

The development of the Index to assess the water sensitivity of places at a range of scales is currently in beta version and builds the case for smarter spending and better collaboration. The tool has gained national and international attention. Pilot projects in Melbourne and Perth were completed in FY1516, and further development will occur in Tranche 2. The Index was also trialled in developing city settings.

Research adoption

The CRCWSC stands at an exciting point of transition. Four years on from our beginnings in 2012, we are interested in more than discovery research; we want to use our findings to provide concrete solutions for our end users. While we continue to research and develop world-class science, technology, innovation, and design, our focus is increasingly shifting to synthesising this knowledge across disciplines, in collaboration with our industry partners.

Building the next generation of water leaders

Understanding the learning needs in industry

As part of the research project "Strengthening education programs to foster future Water Sensitive City leaders", we published the findings from a study of 120 industry practitioners to gain a better understanding of their capacity-building needs. Interview and survey respondents came from Australia, the Netherlands, Vietnam, and Bhutan to reflect a range of developed and developing country contexts. The results have helped inform the development of new industry short courses that will be delivered in future years.

Post graduate education

In FY1516, 22 postgraduate students successfully completed their studies of the CRCWSC module "Urban futures: Delivering Water Sensitive Cities" as part of the Masters in Integrated Water Management (MIWM) – managed by one of our participants, the International WaterCentre.

In FY1516, UNESCO-IHE finished developing a new Masters module based on CRCWSC research. Its incorporation into a UNESCO-IHE master program has been approved for late 2016.

Industry training events

Throughout FY1516 we delivered six key industry training events:

- Biofilters guidelines training course
- Darwin Research Synthesis Workshop
- South Australian Research Synthesis Workshop
- WA Launch of the Adoption Guidelines for Stormwater Biofiltration Systems and the Operation
- Maintenance of Vegetated Stormwater Systems Workshop
- SWAMPED – Master classes in building flood resilience in Elwood.

CRCWSC PhDs as water leaders

The CRCWSC is passionate about educating and supporting the next generation of researchers and water leaders. During FY1516, we supported a cohort of 67 PhD candidates. This group has a strong multidisciplinary mix, with a large number of students coming from non-traditional science fields.

The PhD and Postgraduate Coordinating Committee supports these students and represents the geographic, disciplinary, and experiential diversity of the cohort. This self-organised initiative continued to engage with the PhD cohort and CRCWSC Executive to better understand the skills and capacity-development needs of the students.

In August 2015, the annual PhD retreat was held in Victoria and attended by 49 students. The focus of the two-day retreat was on science communication, networking, and mentoring. Topics included:

- Science communication
- Oral and poster presentation skills
- Understanding audiences
- Pitching ideas
- The importance of networking
- How to establish meaningful mentoring relationships.

During this valuable retreat, the PhD students developed research posters, which were then displayed at the 2nd Water Sensitive Cities Conference held in Brisbane.

Synthesising research into solutions

Our focus on research adoption is supported by our popular Research Synthesis activities, which allow researchers and end users to come together to develop context-specific solutions for real-world projects. These activities provide tangible outcomes for our end users and invaluable feedback to researchers on impact pathways.

During FY1516, we extended the horizons of our synthesis approach by upscaling the process to whole-of-city scale in Darwin (NT). In the policy sphere, we developed ideas for an Economic Evaluation Framework as a tool to implement SA's Water Sensitive Urban Design policy. These were complimented by continuing Research Synthesis activities for on-ground scenarios, such as developing green infrastructure ideas for Central Geelong (VIC).

Kunshan Studio 1
MADA students credit:
S. Bell, S. Chiam, H. Duff, T. Linshoten

Demonstration projects and research application

During the year we trialled our Water Sensitive Cities Index tool, which benchmarks and ranks cities based on their water sensitivity performance. Knowing where a city stands allows us to set targets and compare potential management responses. A prototype was trialled in Perth and Melbourne as well as a number of developing cities in the Asia-Pacific region, including Mandalay (Myanmar), Suva (Fiji), and Kunshan (China). Several of our SME partners were directly involved in these trials.

Influencing policy

Long-term change requires embedding WSC principles within national and state government policy, regulations, and supporting instruments. In FY1516, the CRCWSC continued to work with key stakeholders to support their water policy reform activities, notably:

- Developing a joint submission by our partners to the Greater Sydney Commission on opportunities for more water sensitive planning approaches in NSW.
- Significantly contributing to the development of the urban chapter of the Victorian Government's Water for Victoria policy.
- A key stakeholder engagement activity in South East Queensland (SEQ) that engaged CEOs and senior executives of water utilities, government, and water entities to develop a more integrated approach to urban water management in SEQ.
- Applying the Water Sensitive Cities Framework to influence the strategic investment in urban water services in developing nations, notably with the Asian Development Bank.
- Engaging with stakeholders in Darwin (NT), Elwood (Vic), and Perth (WA) to develop whole-of-government water sensitive visions and policy initiatives.

International impact

We continue to engage with our international partners in delivering our research programs. Our partners in Singapore have actively engaged with Australia-based researchers to develop joint projects funded largely by the Public Utilities Board of Singapore. We have maintained collaborations with partners in Denmark (DTU and DHI) and the Netherlands (UNESCO-IHE). We continue to collaborate with Southeast University in Nanjing on joint research activities, and adapting CRCWSC research to Chinese climatic and biophysical conditions.

Our linkages in the Asia-Pacific region are largely supported through collaboration with the Asian Development Bank (ADB). The ADB has engaged the CRCWSC as a knowledge partner under its Future Cities Program, which aims to increase the resilience, sustainability, and liveability of cities across the Asia-Pacific region. Under this program, we assessed Mandalay, Myanmar and Suva, Fiji using the Water Sensitive Cities Index tool. By expanding our activities in Asia, we "road tested" our research outputs through more than 40 on-ground works; findings are then filtered back into our CRCWSC community.

Our focus has been on China, and the City of Kunshan is a prime example of our success. Since joining the CRCWSC as an incubator city, Kunshan has implemented 35 Water Sensitive City projects, with a capital works expenditure to date of approximately AU$200m. As a result, Kunshan was named one of China's National Ecological Garden Cities – a prestigious award that is highly regarded by the Jiangsu Provincial Government.

In June 2016, a group of CRCWSC researchers and partner organisations travelled to China for the International Low Impact Development Conference in Beijing, where 21 CRCWSC representatives presented 28 papers and seven research posters. They also presented at the China–Australia Water Sensitive City Summit in Kunshan, which focused on research and joint initiatives of the CRCWSC and its collaborators. It was attended by 450 delegates: 350 senior government officials and 100 industry leaders from Jiangsu Province.

We now have an opportunity to use our expertise to impact global water decisions. The CRCWSC has signed an MoU and is now a partner of the Australian Water Partnership – an initiative from Australia's Department of Foreign Affairs and Trade (DFAT). We were invited by DFAT to prepare a framing paper for the High Level Panel on Water on Human Settlements (i.e. cities and towns). This panel, launched in January 2016 by the UN Secretary General and the World Bank President, consists of ten heads of governments, including Australia's Prime Minister.

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MADA students credit:
C. Eggletston, M. Gross, A. Margin, A, Thai

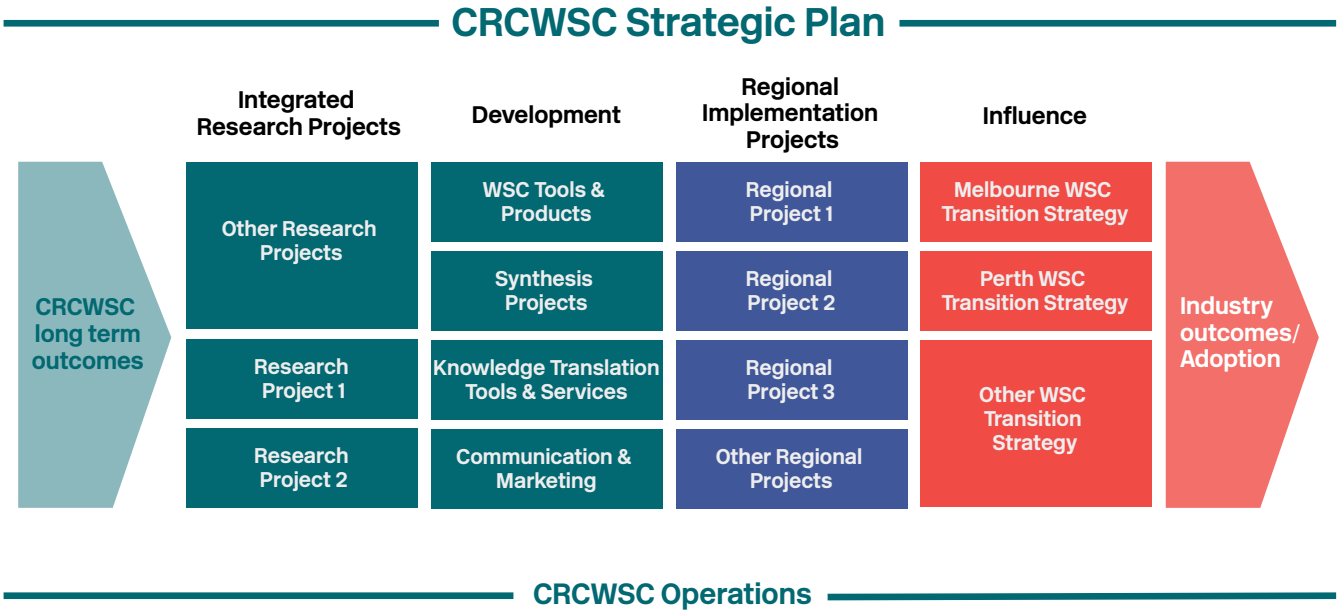
Looking ahead: Tranche 2 programs

With Tranche 1 projects almost completed, we developed the framework for the second tranche of research projects.

We have begun the process with a series of Needs and Opportunities Workshops in Brisbane, Sydney, Melbourne, Adelaide, and Perth. This built a national picture of water cycle management in Australian cities and the priority activities for making those cities more water sensitive.

CRCWSC participant and stakeholder engagement in these workshops was tremendous, with 180 attendees at the five workshops, covering 58 individual CRCWSC participant organisations, plus 58 other (non-participant) stakeholder organisations, demonstrating the broad-ranging interests beyond current participant organisations.

With a clear understanding of the big picture, we then developed the new Tranche 2 structure through two Project Development Workshops and a project prioritisation process – with active involvement from CRCWSC researchers and the industry-focused Regional Advisory Panels. The new structure and topics of the Tranche 2 research activities are:



While we are still in the process of confirming the topics of the Integrated Research Projects (IRPs), our plans are:

IRP1: WSC transition strategy and implementation plans

Aim: Develop WSC Transition Strategies for each RAP region with strong alignment of vision and support across all relevant stakeholders.

IRP2: Comprehensive economic evaluation framework

Aim: Create an agreed evaluation framework to identify economic, environmental, and community values of water-related investments.

IRP3: Evidence-based integrated urban planning across different scales

Aim: Enable integrated planning processes across different scales and jurisdictions, utilising knowledge-based evidence as key input.

IRP4: Achieving WSC outcomes for in-fill developments

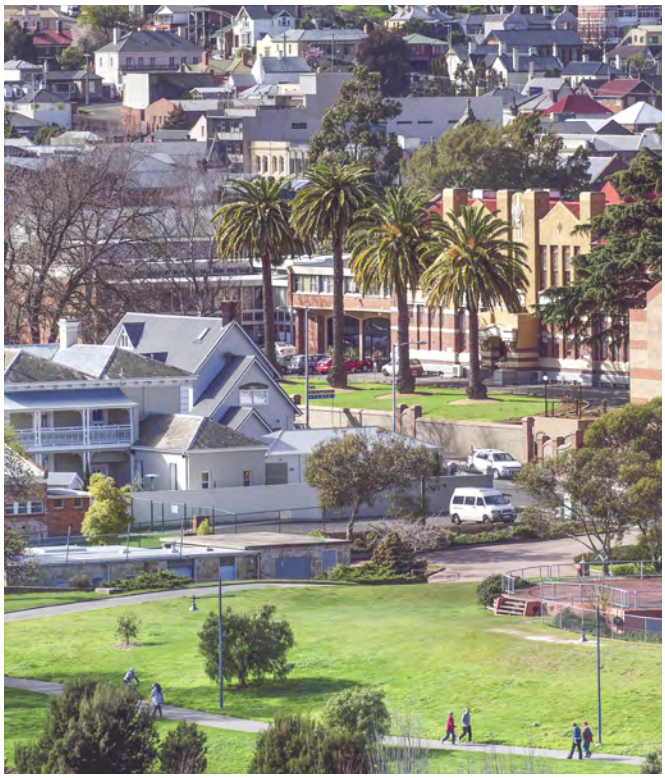
Aim: Develop solutions that deliver overall beneficial WSC outcomes for in-fill developments at different scales.

IRP 5: Knowledge-based WSC solutions for groundwater impacted developments

Aim: Understand the impact and generate WSC solutions for developments in regions with high groundwater tables.

We anticipate that the first two IRPs will start in FY1617. The rest are planned to commence in the following financial year, as they build outcomes from the current Tranche 1 Programs B and C, which still have most activities continuing until the end of FY1617.

Additionally, two further programs: **Tools and Products** and **Knowledge Application and Translation Services** are planned for FY1617 to facilitate adoption of the outcomes from the Tranche 1 projects.



Key changes in governance

During the year we modified our governance structure to support our Tranche 2 direction.

To summarise the key changes:

- A new CRCWSC service delivery model has been developed to reflect the shift from a research program-based structure to a regional implementation structure, strengthening the role of local end users in the process.
- The CRCWSC Executive was reduced to a four-person Executive with portfolio responsibilities spanning Research, Operations, Adoption, and the CEO who will also be responsible for the Strategy and Growth portfolio.
- Five Regional Advisory Panels (RAP) in QLD, NSW, VIC, SA, and WA were created or strengthened to replace the previous Program-based Stakeholder Advisory Sub-Committees.
- The Research Advisory Sub-Committees for each of the four Tranche 1 research programs were consolidated into one Research Advisory Committee.
- The Chairs of the Regional Advisory Panels (RAPs) were invited to join the CRCWSC Advisory Committee.

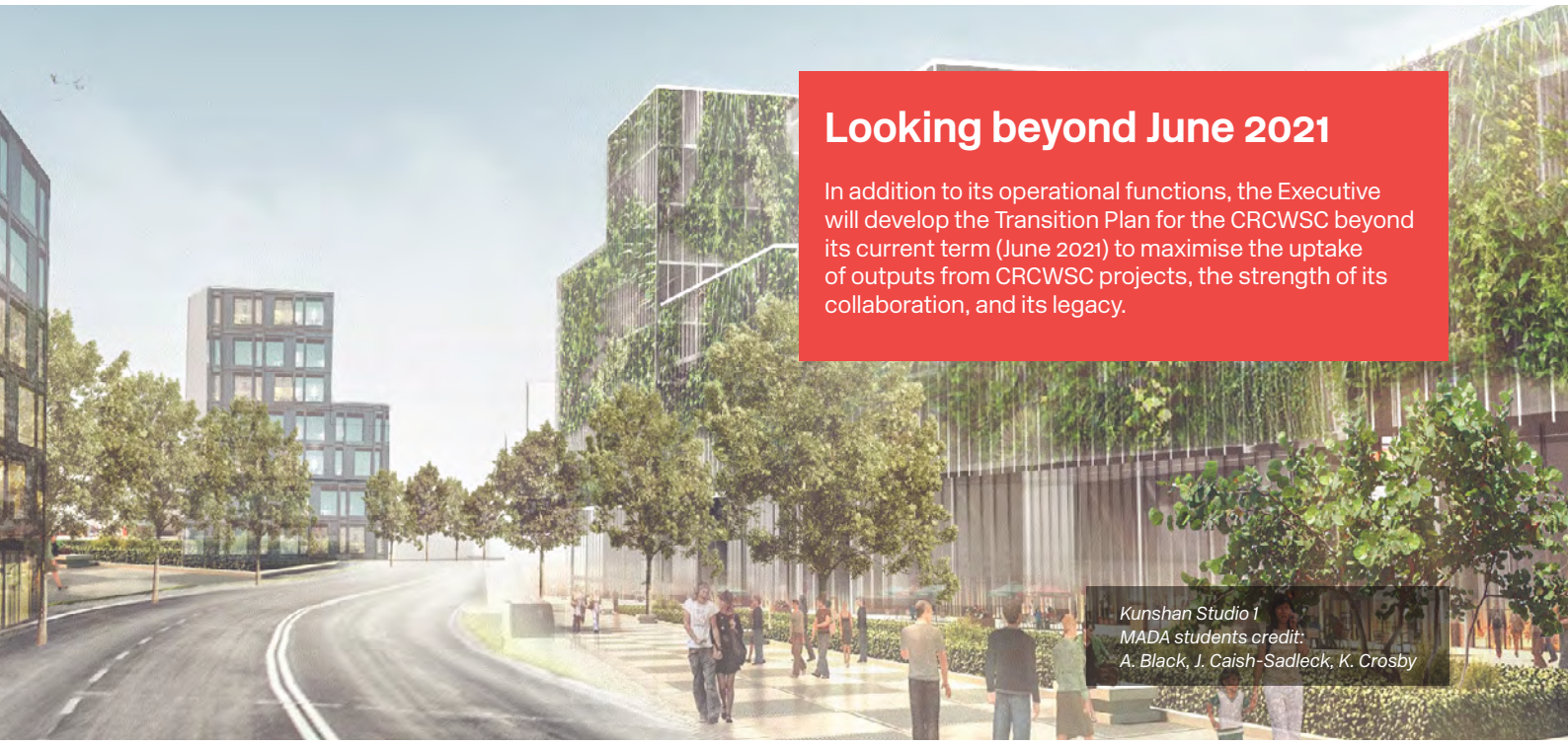
A stronger regional focus to facilitate context-based solutions

We strengthened the role of RAPs in each of the five capital cities. The RAPs include both CRCWSC partners and non-CRCWSC stakeholders, and they provide a forum for discussing the adoption of CRCWSC research. Members are encouraged to become the local champions for water sensitive cities, leading the adoption of evidence-based practice and policy.

A leaner Executive

A four-person CRCWSC Executive was developed for implementation from 1 July 2016, with portfolio responsibilities and administrative structure aligned to the delivery model for Tranche 2 activities to June 2021. In Tranche 2 the Executive will play a lead role in:

- Ensuring extensive uptake of Tranche 1 research outputs by industry and government
- Initiating the Tranche 2 research and research translation activities
- Extending the CRCWSC's international reach.



Looking beyond June 2021

In addition to its operational functions, the Executive will develop the Transition Plan for the CRCWSC beyond its current term (June 2021) to maximise the uptake of outputs from CRCWSC projects, the strength of its collaboration, and its legacy.

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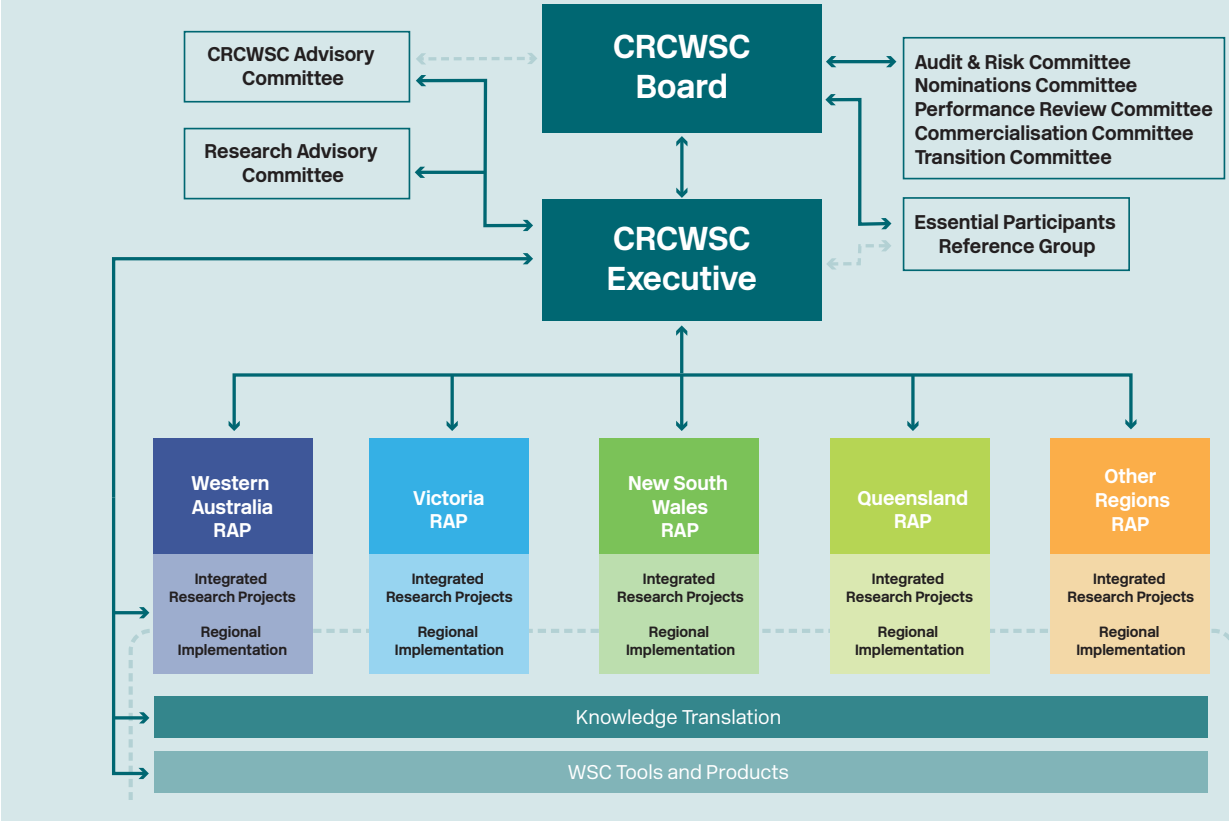
MADA students credit:
A. Black, J. Caish-Sadleck, K. Crosby



CRCWSC Board

Cheryl Batagol
Chairman and Chair, Nominations Committee

Prof. Robert Skinner
Deputy Chairman

Greg Claydon
Director

Nicholas Apostolidis
Director, (incoming) Chair, Performance Review Committee

Dominic Dolan
Director

Stephen Frost
Director

Peter Betsen
Director

Kerry Stubbs
Director, Chair, Audit and Risk Committee

Leith Boully
Director

Prof. John Dell
Director

In August 2016 four Board positions expired. At this time two members successfully nominated for reappointment, two retired from the Board and two new members were elected. These changes are described below:

- **Greg Claydon**: Reappointed to Board
- **Nicholas Apostolidis**: Reappointed to Board
- **Prof. John Dell**: Retired from Board
- **Stephen Frost**: Retired from Board
- **Prof. Simon Briggs**: Appointed to Board
- **Dr. Mike Mouritiz**: Appointed to Board

We thank Prof. John Dell and Stephen Frost for their substantial contributions to the CRCWSC since their appointments in 2013, and for their leadership in the pursuit of the CRCWSC's vision.

Financial management

The CRCWSC has completed its fourth full year of operational activities. Finances in FY1516 have been healthy and free of significant financial issues. Following the FY1516 audit, our auditors complimented the CRCWSC on our financial management.

Key financial notes

$10.38M Income for year ended 30 June

$10.38M Expenditure for year ended 30 June

$1.2M Audited balance of funds at year end

$1.85M Essential Participant contributions

$1.01M Other Participant contributions

All employment costs and other compliance obligations have been accounted for, and the CRCWSC does not have any loans, other than minimal outstanding credit card balances.

The CRCWSC was endorsed by the Australian Taxation Office for charity tax concessions effective from 17 May 2012 and is exempt from income tax.

Our partners

Essential participants

VICTORIA State Government

Government of Western Australia Department of Water

Government of Western Australia Department of Housing

MONASH University

The University Of Queensland AUSTRALIA

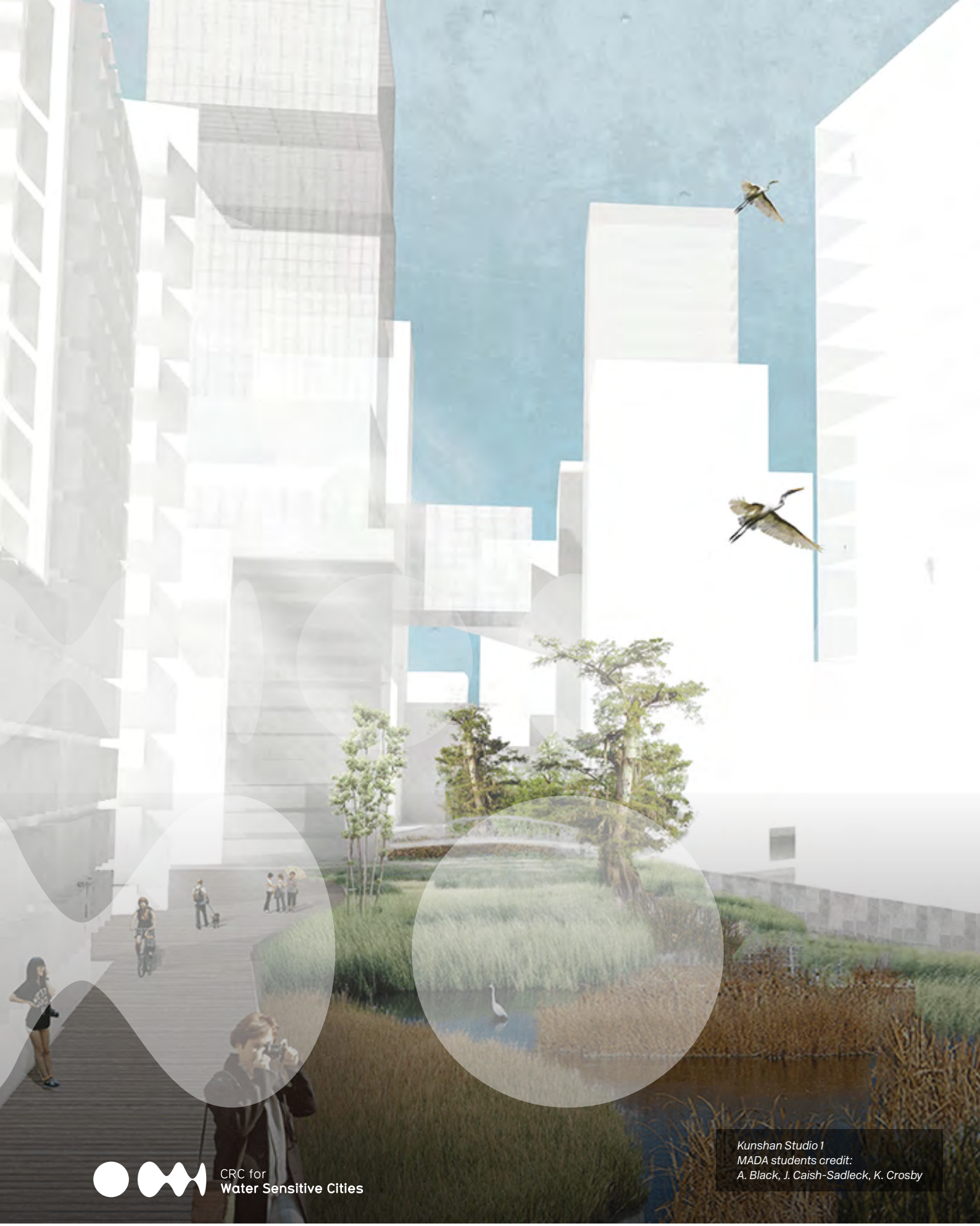
The University of Western Australia Achieving International Excellence

Melbourne Water

South East Water

Other participants

SME associate partners



CRC for
Water Sensitive Cities

Kunshan Studio 1
MADA students credit:
A. Black, J. Caish-Sadleck, K. Crosby

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