Skilling for the future of the Australian Alps' rivers and catchments

A survey of Managers and Scientists

October 2010

A Report to the Australian Alps Liaison Committee

Water and Catchment Reference Group

Summary

Thirty Alps park managers, technical specialists, scientists and external scientists were interviewed by email and telephone in Oct-Nov 2010. Respondents were asked to nominate their key issues of concern for Alps national park water and catchments in a time of climate change and how well they were placed to access relevant expertise to deal with these issues.

The findings were presented in a poster at the 2010 Thredbo Australian Society for Limnology congress (Appendix I). Priority issues identified were: improved understanding of hydrology in conservation management; the current and probable effects of climate change on catchment function and the condition of bogs, wetlands and rivers; developing appropriate fire regimes and responses to wildfire for mountain catchments affected by climate change, documenting the effects of invasive species on the condition of mountain bogs, wetlands and rivers, managing for uniqueness of mountain bogs, wetlands, rivers and their fauna, and maintaining parity with coastal regions (eg. coastal erosion) for investment in climate change response.

The survey reported that:

- Park management agencies are mainly staffed by highly skilled generalists who rely on expert assistance to guide and solve wetland, river and catchment management issues. There are some well-known sources of expertise in these fields both within and external to agencies. However, this expertise is a small and fragmented resource, and is often inaccessible due to time, resources or communication constraints.
- The skills base in water and catchment management fields is limited and diminishing within agencies, however, this could improve if sufficient priority is given to these objectives along with continuity of funding. Developing solutions to difficult river and catchment management problems requires a multidisciplinary team approach between scientists, technicians and managers, but existing resources restrict this approach being taken.
- There is a need to increase access to data and information about catchment hydrology, water quality and river and wetland health so as to build park managers' understanding of these topics. This will assist them to relate this information to the effects of management practices, park developments and invasive species.
- Agencies face some delays and difficulty in recruiting, developing and retaining expertise for these fields. This is often due to short-term employment opportunities in a mobile and competitive workforce.
- Sourcing external advice is expensive and the retention of knowledge at the local management level is low. In addition, the input of local knowledge is often required for external advice to be translated into practical management outcomes.

Solutions to these issues exist at a range of levels, including implementation into park operations of the sometime aspirational goals contained in plans and strategies, identification of clear performance targets for eg. river health and water quality, practical field-based training suitable for a generalist workforce supplemented with specific skill development and tools, and coordinated management of data and information in an accessible form for park managers.

More broadly, there is opportunity for the AALC agencies to partner with water industry and Australian government initiatives in developing strategies to boost water and catchment management skills.

Conclusions

Water and catchment management is very important to achieving Alps park objectives but the management outcomes aren't always clearly defined, managers are seeking and retaining relevant skills for their needs in the face of a technical skills shortage, however the Alps agencies could find it increasingly difficult to retain relevant skills and expertise if a coherent strategy is not developed.

Preface

This survey was conducted by the water and catchments working group on behalf of the AALC, and initiated in response to the AALC project – *Caring for our Australian Alps catchments (*Worboys, Good and Spate 2010).

The premise of this survey was that whilst current Alps national park land management issues and resourcing dimensions were being identified in the Warboys *et. al.* work, was useful also to identify the technical capacity that managers and scientists thought would be necessary to address those issues.

This was prompted in part by identification at the National level of an existing and deepening skills shortage in the water industry, and the likelihood that Alps agencies would be competing for a diminishing pool of expertise in water and catchment work.

An existing and deepening Australian skills shortage in the sciences, engineering & specifically the water sector was identified in a report to the Council of Australian Governments (CoAG)[(i)], July 2008. Preliminary estimates are for an increasing shortfall of between 26,000 & 40,000 employees by 2018 in the water sector alone (See Figure).

CoAG has responded to this issue with a national water industry skills strategy & taskforce. A business plan[(ii)] is currently under development by the Australian Water Association.

Industry-wide initiatives do not adequately identify the needs of Australian Alps park managers, as they are general in scope and tend to focus on the lower end of river catchments. They do however provide context, the opportunity to participate in analyses, and potential resources to develop response strategies. There was interest from industry groups in the further involvement of park managers in the development of these strategies.

An email and telephone survey (Appendix II) was designed and implemented that first verified the catchment issues that participants saw as a priority for alps management; secondly, sought their views on access to technical capacity to effectively manage the issues; and thirdly *asked participants to identify some solutions*?.

This report contains the survey responses. The key outcome of this work was a poster presentation at the 2010 Australian Society of Limnology (ASL) Congress in Thredbo, NSW (Appendix II).

[(i)] *National Water Skills Audit, International Centre of Excellence in Water Resources Management (ICEWaRM), 2008.*
[(ii)] *National Water Skill Strategy Draft Business Plan, Australian Water Association for the Water Industry Skills Taskforce,2010*.

The Survey

Participants for the survey were selected primarily from the group of people who contributed to the AALC project *Caring for our Australian Alps catchments – a climate change action strategy for the Australian Alps to conserve the natural condition of the catchments and to help minimise threats to high quality water yields 2010;* and participated in workshops conducted by Worboys, Good and Spate for that project. The reason for this was to link a discussion of skills capacity as closely as possible with the relevant water and catchment issues. Some supplementary participants were also selected by water and catchments reference group members.

The survey (attached) was emailed to 78 participants on 3/9/10. After a low initial response, a second follow up email was sent on 25/10/10. Follow up phone calls for

phone interviews were undertaken in October and November. Of participants contacted by email and by phone there were a total of 30 complete responses.

Some participants did not complete the survey for a variety of reasons including being on leave, change of job, current role not relevant to the survey (e.g. policy) and other competing work commitments.

Participants were supportive of the survey, the issues appeared very relevant to them and they were enthusiastic and happy to share their perceptions about the issues. Although the sample size is relatively small, the sampled group represents those most affected by or involved in relevant water and catchment management.

Results

***Question 1*: Do you *believe* there are appropriately skilled or experienced specialists available in your area of management to meet the current objectives of your agency with respect to Australian Alps rivers, catchments and climate change issues?**

A number of respondents who answered *'yes'* to the first question qualified their response by indicating that there were not enough people available, or they were too busy to meet the current objectives of their agency with respect to Australian alps rivers, catchments and climate change issues which indicated they are under resourced.

Survey respondents also indicated that while they might manage to address rivers and catchments, the expertise or time to address climate change issues was not available. Not all respondents made a comment.

Yes	1
No	28
Don't know	1
total	**30**

Themes or issues

Responses	
Yes, but more people needed	1
Yes, but information is fragmented / need a team approach	2
No - more people needed	2
No – mostly generalists, more people with greater skills and knowledge needed	16
No – lack of political will / funding	2

Question 2. Can you identify or specify three key issues relevant to Australian Alps rivers and catchments that you are managing or working, where a shortage of skills or expertise is of a concern to you, in decreasing order of significance?

Three groups of priority are reported (A,B,C), although no attempt has been made to analyse the relative importance or recurrence of any particular issue. The purpose of this question structure was to 'sift' the issues of highest priority and not to mask issues considered subsidiary by the respondents.

A - The issue of greatest concern identified by respondents

Hydrology (n=11)

1. Hydrology – (1)
2. Montane flows – environmental benefits
3. Climate change, increasing water temperatures, changes in snow melt hydrology
4. *Need for agreed methodology and skills / resources to assess health and condition of rivers and wetlands within Alpine parks

5. *Water quality issues and monitoring relating to feral animals (1)
6. River gauging and flow records and publication of these (3)
7. Storm water management (increased velocity and quality of runoff) from built structures.(3)
8. *Feral horses-not measuring or monitoring their impact on water quality (3)
9. *Water quality (people available)
10. *Soil / geomorphology / water / limnology
11. *Alps provide water for Murray Darling and coastal catchments, no program or knowledge about how to manage the park to properly manage quality and quantity of water.

Threatened species (n=1)

1. *Need to address the impacts of climate change, for example the impact of increased predation on the pygmy possum with a reduction in the protection of snow cover.

Invasive plant / weeds (n=4)

1. Riparian vegetation management (weed issues) in areas of disturbance and downstream. (2)
2. Emerging new weeds (2)
3. *Feral animals / weeds
4. Pest plants – expertise is adequate but there is a lack of resources / funding to adequately manage.

Invasive animals (n=7)

1. Deer control – knowledge and management issues – impact on water quality
2. *Feral horses-not measuring or monitoring their impact on water quality (3)
3. *Feral animals / weeds
4. *Health and critical thresholds of upland bogs, not enough information on feral horse impact – and what level of damage these shallow ground water systems can sustain before fundamental degradation takes place / the damage is irretrievable. (skills not available)
5. *Water quality issues and monitoring relating to feral animals (1)
6. *Need to address the impacts of climate change
7. Feral animals – feral horses, lacking expertise and capacity.2

Climate change (n=3)

1. *Need to address the impacts of climate change.
2. Climate Change
3. *Climate change impact on water generation and snow melt/ flow/ runoff reduction impact on downstream values (e.g. Ramsar wetlands) (2)

Insufficient funding for research / structural issues (n=6)

1. Funding needed for long term research and monitoring.
2. *Sub-alpine bog restoration – most northern alpine bogs (no money for this) (3)
3. *Need for agreed methodology and skills / resources to assess health and condition of rivers and wetlands within Alpine parks
4. *Feral horses-not measuring or monitoring their impact on water quality (3)
5. *Need to address the impacts of climate change. (for example the impact of increased predation on the pygmy possum / with the reduction of the protection of snow cover).
6. *Alps provide water for Murray Darling and coastal catchments, no program or knowledge about how to manage the park to properly to manage quality and quantity of water.

Access to expertise (n=9)

1. Lack of expertise/ trained /available people / decline in the people available for vegetation surveys and historical understanding of the ecological processes in the alps. When current knowledge holders retire a significant body of knowledge will be lost.
2. Not much expertise within parks agencies / protected area managers, in catchment management / freshwater management – these positions do not require expertise in this and there would be a need to establish the criteria to include this area of expertise within the position – it is a structural problem – there would be a need to identify and justify this criteria.
3. Health and critical thresholds of upland bogs, not enough information on feral horse impact – and what level of damage these shallow ground water systems can sustain before fundamental degradation takes place / the damage is irretrievable. (skills not available)
4. *Alps provide water for Murray Darling and coastal catchments, no program or knowledge about how to manage the park to properly manage quality and quantity of water.
5. There is a lack of understanding of ecological processes of alpine peatlands to be able to judge their state in any form.
6. Insufficient information to manage peatlands and alpine communities.
7. Lack of scientific skills - monitoring, design and analysis skills across the board
8. *Fire and fire ecology – the organisation has no handle on how fire affects the rivers and water flow in general.(no expertise available)
9. *Water quality (people available)

Alpine bogs / peatlands / wetlands (n=5)

1. *Sub-alpine bog restoration – most northern alpine bogs (no money for this) (3)
2. Climate change impact on water generation and snow melt/ flow/ runoff reduction impact on downstream values (e.g. Ramsar wetlands) (2)
3. There is a lack of understanding of ecological processes of alpine peatlands to be able to judge their state in any form. Insufficient information to manage peatlands and alpine communities.
4. Health and critical thresholds of upland bogs, not enough information on feral horse impact – and what level of damage these shallow ground water systems can sustain before fundamental degradation takes place / the damage is irretrievable. (skills not available)
5. Insufficient information to manage peatlands and alpine communities.

Effects of fire on water quality and quantity (n=2)

1. Water quantity – relating to fire frequency (the impact of regrowth on water going into the catchment, regrowth means less water going into the catchment, old growth uses considerably less water – needs to be studied as it directly impacts on available water in catchments) (2)
2. *Fire and fire ecology – the organisation has no handle on how fire affects the rivers and water flow in general.(no expertise available)

B - Second most important issue / area of concern identified by respondents

Hydrology (n=4)

1. hydro dynamics of the Alpine and sub-Alpine areas
2. Environmental water allocations to alpine streams
3. *Water quality due to fire frequency (2)
4. *Water yield (people not available)

Threatened species (n=1)

1. Threatened species (some expertise available)

Invasive plant / weeds (n=2)

1. *Soil and surface cover analysis (3)
2. Invasive plants

Invasive animals (n=2)

1. Feral pig control (no money for this) (3)
2. *Fish ecology / native fish in montane streams. The impact of introduced fish (e.g. trout) on native fish populations – tiny pockets of remnant native fish populations and are they sustainable. (people not available to address)

Climate change (n=7)

1. *Groundwater dependent ecosystems (e.g. alpine wetlands / bogs) (2)
2. *Lack of climate change research
3. Impact of climate change
4. *Need to focus on practical programs to help address or reduce the impacts.
5. Impacts of climate change on aquatic invertebrates, chemical changes in glacial lakes and streams. E.g. Fish have never been recorded in Lake Cootapatamba. In 2006 / after the bushfires, fish appeared for the first time in Lake Cootapatamba – however, there is no-one to study the impact of those fish on the lake's ecosystem - which will have a huge impact.
6. *Water quality due to fire frequency (2)
7. *Climate change – understanding – lack sophistication / lack of qualified – tertiary trained and experience

Insufficient funding for research / structural issues (n=8)

1. *Lack of climate change research
2. Need for agreed AALC / PWG program that recognises the importance of Alpine rivers / catchments (2)
3. *Soil and surface cover analysis (3)
4. Flow on – measuring / monitoring the success of rehabilitation of streams / rivers (3)
5. *Climate change – understanding – lack sophistication / lack of qualified – tertiary trained and experience
6. Lack of corporate knowledge / memory - There are no structural processes in place to ensure continuity of knowledge, with the outcome being a loss of corporate knowledge. People in DECCW are unaware of work and findings done by previous people, sometimes within short timeframes e.g. 5 years – loss of knowledge / reinventing the wheel. Passing on of knowledge is left to the passion and conscience of individuals.
7. Fish ecology / native fish in montane streams. The impact of introduced fish (e.g. trout) on native fish populations – tiny pockets of remnant native fish populations & are they sustainable. (people not available to address this)
8. *Need to focus on practical programs to help address or reduce the impacts.

Lack of expertise (n=6)

1. *Water yield (people not available)
2. Lack of specialist ecologist / environmental scientists in regional areas in the park.
3. *Climate change – understanding – lack sophistication / lack of qualified – tertiary trained and experience

4. Alpine bogs / peatlands / wetlands

5. *Groundwater dependent ecosystems (e.g. alpine wetlands / bogs) (2)
6. *Rehabilitation of soils and sensitive wet areas, increased awareness needed in these areas 2)

Effects of fire on water quality and quantity (n=3)

1. Hydrological impacts of fire
2. Water quality due to fire frequency (2)
3. How to manage fire to protect water quality and quantity values.

Communication with the public (n=2)

1. A perception that willow removal is increasing erosion and flooding risks (1)
2. *Rehabilitation of soils and sensitive wet areas, increased awareness needed in these areas 2)

C. Third-most important issue identified by respondents:

Hydrology (n=3)

1. Development of aquatic reserve systems or alpine rivers, improvement in hydrologic connectivity
2. Stream bank management (appropriate stabilisation – revegetation) (2)
3. Trend / assessment of water quality and threats to water quality (2)

Threatened species (n=1)

1. *Development of aquatic reserve systems or alpine rivers, improvement in hydrologic connectivity

Invasive plant / weeds (n=1)

1. Effective management strategies to eradicate and control riparian weeds. (expertise available)

Invasive animals (n=1)

1. Invasive animals

Climate change (n=0)

Insufficient funding for research / structural issues (n=14)

1. *Need for agreed AALC / PWG program that recognises the importance of Alpine rivers / catchments (2*) and resources them accordingly and on par with other park management issues (3)
2. Resource AALC / PWG program commensurate / recognising the importance of alpine rivers and catchments / on par with other park management issues.
3. Current PWG staff are fully tasked to basic threat / park management (e.g. fire, pests, weeds) but it is difficult to quantify the contribution of this work to catchment health or protection of river / catchment values without those items above (3)
4. Cloud seeding research needed
5. Ecologists and ecological historians (3)
6. There needs to be less focus on the coast and direct more funding for alpine areas to address climate change.
7. Inappropriate management of northern alpine bogs (ACT) – tourism is getting priority over protection of sensitive areas – increased visitation = increased risk of damage / fire etc. impact of tourism / increased risk not being recognised or managed
8. *Ability to forecast new recreational trends and the impact on the environment (2)
9. River regulation (some expertise, but need more)
10. *Very little is known about alpine aquatic ecosystems – unique biodiversity of peatlands, wetlands – therefore no management is possible.
11. Cloud seeding research (cloud seeding research is largely beyond the scope of DECCW, but the lack of independent research is a concern.

12. Retiring group of land scientists are not being replaced. Field skills are not being taught due to too much reliance on data management with GIS and similar. Much data is hidden or lost due to privatisation of water and land authorities.
13. Lack of funding to address alpine catchment issues
14. Substantial research programs and a new management arrangements are required

Lack of expertise (n=3)

1. *Very little is known about alpine aquatic ecosystems – unique biodiversity of peatlands, wetlands – therefore no management is possible.
2. Lack of appropriately skilled people with GIS data analysis, spatial and remote sensing skills.
3. *Very specialised area (alpine bogs) and the expertise in Australian alpine bogs is just not available

Alpine bogs / peatlands / wetlands (n=2)

1. *Very little is known about alpine aquatic ecosystems – unique biodiversity of peatlands, wetlands – therefore no management is possible.
2. *Very specialised area (alpine bogs) and the expertise in Australian alpine bogs is just not available

Effects of fire on water quality and quantity (n=3)

1. Impact of wildfires on the alpine rivers, streams and wetlands
2. Forrest fuel management (no money for this) (3)
3. Climate change modelling – fire frequency (2)

Communication with the public (n=2)

1. Communication – the ability to work with communities to explain complex issues and work towards a resolution, to move from understanding to action.
2. Having communities who value catchments and are prepared to take strong decisions to benefit the environment; and to make those decisions in relatively short timeframes will be a real challenge.

Effects of fire on water quality and quantity (n=2)

1. Fire – getting better at this – can access the expertise either internally or externally
2. *Very little is known about alpine aquatic ecosystems – unique biodiversity of peatlands, wetlands – therefore no management is possible.

<u>Question 3</u>. Do you think the existing recruitment and management services of your agency, including learning and development programs, will be able to adequately address skill and expertise requirements in relation to Australian Alps rivers, catchments and climate change?

Most responses were qualified and sometimes contradicted by the comment following. There was only one unqualified 'yes' response in this question that related to an emphasis on river management skills, geomorphology / weeds in recruitment processes.

Yes	1
No	28
Don't know	1
total	**30**

Themes / issues / concerns:

Management priorities / funding / policy (n = 10)

1. Adequate funding / resources are required for an effective response
2. Government need to see the Alps catchments and impacts of climate change issues / needs as a priority before funding will follow.
3. If management priorities change than the recruitment and training will follow
4. Will require sourcing of consulting / academic skill – and associated budgeting to facilitate this.
5. Substantial reductions in aquatic scientists in the water agencies over the past decade have limited the capacity of government to cover all key water sources
6. Priority should be on funding research and monitoring in alpine areas.
7. Easy to recruit a WQ expert but don't have the funding – need to draw upon existing staff / dept network
8. We have failed to address climate change previously, unlikely to be addressed in the future.

Policy for recruitment of specialist staff (n=4)

1. The generic nature (constraints) of agency recruitment policy make it difficult to recruit specialists; can't get what you want / need.
2. The organisation employs generalists and there is a limited ability to employ specialists or technical skills needs
3. As agency recruits internally first, it restricts the new expertise entering the organisation and hence level of skill. The level of training is limited and inadequate.

Policy for retention and development of specialist staff (n=8)

1. There are no professional courses provided within agency to train staff in catchment management (unsure of CMA courses?) – most staff take opportunities from external workshops / training if a work priority. Some field courses (e.g. erosion control) are available occasionally. Has been information on climate change distributed to staff at workshops but not so for catchment / river management.
2. No real policy commitment evident to developing or recruiting in house expertise in these areas, reliance on external providers and specialists. Limited training and development for existing staff in these areas – really requires more focus.
3. Need to integrate new science / developments in science into training.
4. More training and development needed for existing agency staff on the impacts of Climate Change on alpine catchments
5. Many terrestrial aspects are OK, but staff lack the knowledge and sophistication to address climate change.
6. Field courses are declining and regarded as too expensive to run. Laboratories have been removed in favour of seminar rooms. Field vehicles have been removed as a clear hint to staff and students that if it isn't Corolla-accessible it is off the radar.
7. Greater training and resources for research needed. Declining level of expertise and ability to attract and retain people.
8. Additional training in rehabilitation in riparian / wet areas could be of assistance as for long term management it is important that agency staff are given the expertise to manage these systems appropriately.
9. There has been some development work on climate change adaptability (in relation to baseline monitoring) but in general not enough.

Question 4. Do you think retention of contractors and/or external expertise could assist you with skill and expertise requirements in relation to Australian Alps rivers, catchments and climate change issues?

Yes	23
No	4
Don't know	2
total	**29**

Most responses were qualified by the provided comments.

Themes / issues / concerns:

Making current research available for setting management objectives and integrating knowledge into corporate memory. (n=17)

1. Additional training in rehabilitation and / or external expertise could be of assistance, although for the long term management it is important that agency staff are given the expertise to manage these systems appropriately.
2. Insufficient funding is the real issue, not the lack of available resources / expertise
3. The key to engaging external contractors in a meaningful way is to have them work closely with agency staff, not at arm's length, and incorporated research activities into agency business. Part of external contractors / specialist briefs could include training and development components.
4. Much of the information we know on water yield, for example, has been sourced from external consultants – at a cost.
5. High resolution modelling of climate change is required, but agency staff need to be part of the management team to influence and support what is happening in the field – to advise and support decision making / planning
6. Specialists for alpine bogs, weeds and landscaping can be outsourced.
7. One way of addressing the skills gap is to outsource, currently occurring in agency.
8. Contract and external expertise does supplement research work, but this knowledge and expertise is not retained when they leave and move on – due to lack of ongoing work / funding.
9. Additional training in environmental rehabilitation and / or external expertise could be of assistance, although for the long term management it is important that agency staff are given the expertise to manage these systems appropriately.
10. Agencies can tap into scientific expertise to form into a management response.
11. Outsourcing could be available – budgets will determine – but expertise is not available on tap – will only be a partial solution – need in house / on tap
12. Outsourcing will assist with workload, but not in the development of skills in the organisation as not retained, leading to a loss of resource / corporate memory.
13. Outsourcing contractors and external specialists is one of several elements to build capacity, building partnerships with relevant stakeholders.
14. While sourcing external expertise will help to an extent, externals need management support to be able to utilise their work / results, to communicate the implications and implement them. External consultancy will not work on its own.
15. Outsourcing is only useful for short term training but not for ongoing understanding and monitoring requirements. The agency requires its own expertise and resources to monitor and manage catchments and rivers within Parks. Most existing ecologists and park managers are across climate change issues as they related park management as part of their ongoing duties.
16. External expertise could help, but this would only be for the short term, and is not cost effective. Need to skill existing staff.
17. While outsourcing may help in the short term, those people move on / are not available for the long term.

Long term research is needed (n=4)

1. Input from external sources / universities etc is good and contributes to what is needed, but they have their own very specific (eg. PhD and publication focussed) perspective, not the broader needs of the alpine catchment or alpine park focus

2. Involvement of universities would help considerably in the short term for research and monitoring, but will not help in the longer term research. One would think that the unique environment would attract the interest of PhD students / researchers, but this is sadly not the case.
3. Outsourcing is a temporary fix. At present we provide mild encouragement for retired persons with expertise to donate their teaching and research expertise. This can't go on forever.

Insufficient funding is an issue (n=4)

1. There is not a knowledge gap, but a lack of funding.
2. No money available to outsource or develop skills.
3. Funding is a problem – need an internal arrangement
4. With funding being reduced every year there will be other competing priorities.

Contractor availability (n=2)

1. There are no relevant contractors available – none to retain.
2. There is a need to give contractors regular cyclic work contracts to ensure their availability, continued learning and skilling. Community groups likewise can be used to meet the needs and again need to be involved on a regular basis.

Question 5. Have you been directly involved in recruiting specialist staff in relation to rivers, catchments and climate change issues, either internally or outsourcing?

Responses		%
Yes	18	
No	9	
Don't know	2	
total	**27**	

If you answered *yes* to question 5, did you experience any problems in recruiting specialists?

Responses		%
Yes	9	
No	11	
Don't know or N/A	2	
total	**23**	

Comments:

For 'yes' responses:

1. Could not fill the position / required expertise was not available / had to accept a less qualified / experienced person. Good people are coming through, but if the timing is not right – i.e. the project and the money at the time, then those people move on and are lost to another system / area / country.
2. Not many people with relevant skills and why would they bother when all that is on offer is short term contracts - delay in filling the position of a month or more.
3. Support for science based positions within agency is limited as the focus is on operational matters. Field based expertise could be improved through suitable catchment management training course
4. There are generally suitable staff or graduates available for lower entry positions if there were available (e.g. TO/PO positions) but there are few opportunities for them to progress / develop within PWG within this field.

5. Science based positions are typically not considered 'frontline' therefore staff must spend time and resources providing additional justification for a position, find funding, etc.
6. The ability to apply scientific / research knowledge to practical park management solutions remains a challenge.
7. HR issues - restricted by HR policy and operational constraints, eg. delays in filling positions of a month or more
8. Problems with recruitment of technical and ecologist staff to undertake basic wetland data collation and mapping project as well as monitoring and applied research to park management values and issues. In general these have been temporarily funded and / or directed towards a range of duties and not specialised on rivers / catchment management.
9. OK for fire ecology, but can be difficult depending on how specialised the work is – then people are often not available due to other projects, ie. There is competition for these skills.

For 'no' responses:

1. Specific skills are required for these types (water and catchment) of research. In general, permanent appointments will ensure that the right type of specialist will apply for position. The issue for our research program is the funds to undertake the work, not a shortage of skills.
2. I was lucky at the time that somebody with the right skills wanted to work on my project. Generally, it would be touch and go to complete a successful recruitment.
3. No problems with the right program / contract i.e. right money and long term project.
4. They were keen to take the job as a consultant!
5. There is a small group of specialists out there, the problem is funding initially for the position and secondly retaining the person.
6. Short term contracts are not an attractive option for scientists, who go overseas for more stable long term positions.
7. Couldn't retain staff – lack of vision / priority and therefore lack of funding.

Skilling for the future of the Australian Alps' rivers & catchments

Graeme Enders, Elena Guarracino, Anthony Evans, Tamara Boyd, Andrew Warden & Emma Warren[1]

Climate change will present considerable management challenges for the rivers & catchments of the Australian Alps National Parks.
Climate change is predicted to affect water yield & quality & precipitation patterns, notably snowfall.
Its affects on vegetation, fire regimes, habitat condition & invasive species' distribution & abundance are already being detected.
Australian Alps' headwater rivers & catchments are valued for their conservation significance & are used for recreation, tourism & industry. Park management plan objectives identify the values to be protected, but accessing the expertise & skills necessary to analyse & form practical responses will present a significant challenge to Alps catchment & water managers.

'Major regions across Australia face considerable risks from climate change impacts, & in many cases these risks will span a range of sectors. Effective decision-making will need to be supported by integrated, multi-disciplinary assessments of vulnerability to climate change.'

National Climate Change Adaptation Framework CoAG 2007

The Industry Context:

An existing & deepening Australian skills shortage in the sciences, engineering & specifically the water sector was identified in a report to the Council of Australian Governments (CoAG)[a], July 2008. Preliminary estimates are for an increasing shortfall of between 26,000 & 40,000 employees by 2018 in the water sector alone (See Figure).

CoAG has responded to this issue with a national water industry skills strategy & taskforce. A business plan[b] is currently under development by the Australian Water Association.

Industry-wide initiatives do not adequately identify the needs of Australian Alps park managers, as they are general in scope & focus on the lower end of river catchments. They do however provide context, the opportunity to participate in analyses, & potential resources to develop responses. There is interest in the further involvement of park managers in the development of these strategies.

[a] *National Water Skills Audit, International Centre of Excellence in Water Resources Management (ICEWaRM), 2008.*
[b] *National Water Skill Strategy Draft Business Plan, Australian Water Association for the Water Industry Skills Taskforce,2010.*

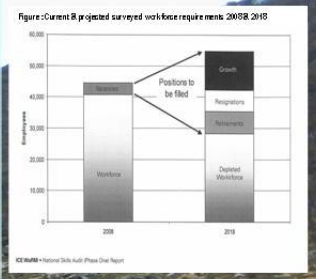

Figure : Current & projected surveyed workforce requirements 2008 & 2018

Survey Results:

Thirty Alps park managers, technical specialists, scientists & external scientists were interviewed by email & telephone in Oct/Nov 2010. Respondents were asked to nominate their key issues of concern for water & catchments in a time of climate change & how well they were placed to access relevant expertise. Key findings are as follows:

- Park management agencies are mainly staffed by highly skilled generalists who rely on expert assistance to guide & solve wetland, river & catchment management issues.
- There are some well-known sources of expertise in these fields both within & external to agencies. However, this expertise is a small & fragmented resource, often inaccessible due to time, resources or communication constraints.
- The skills base in these fields is limited & diminishing within agencies, however, this could improve if sufficient priority is given to water & catchment management objectives along with continuity of funding.
- Developing solutions to difficult river & catchment management problems requires a multidisciplinary team approach between scientists, technicians & managers, but existing resources restrict this approach being taken.
- There is a need to increase access to data & information about catchment hydrology, water quality & river & wetland health so as to build park managers' understanding of these topics. This will assist them to relate this information to the effects of management practices, park developments & invasive species.
- Agencies face some delays & difficulty in recruiting, developing & retaining expertise for these fields. This is often due to short-term employment opportunities in a mobile & competitive workforce.
- Sourcing external advice is expensive & the retention of knowledge at the local management level is low. In addition, the input of local knowledge is often required for external advice to be translated into practical management outcomes.

The Priority Issues*:

- *Hydrology & management* – understanding surface & groundwater hydrology of Alps catchments in a management & conservation context.
- *Catchment function & condition* - the current & probable effects of climate change on catchment function & the condition of bogs, wetlands & rivers.
- *Fire management* – developing appropriate fire regimes & responses to wildfire for mountain catchments affected by climate change.
- *Invasive species* - documenting the effects of invasive species on the condition of mountain bogs, wetlands & rivers.
- *Managing for uniqueness* – providing conservation management consistent with the unique status & requirements of mountain bogs, wetlands, rivers & their fauna.
- *Investment* - maintaining parity with coastal regions for investment in climate change response.

*Identified by Alps park managers & scientists in this survey.

Some Solutions:

- Clearly stated operational park management objectives, priorities & resources for waters & catchments across the Alps.
- Water and catchment management that is based on performance against clearly stated outcomes & parameters, e.g. river health, water quality.
- A collective commitment to long-term, multi-disciplinary research that informs management & focuses on climate change impacts.
- Long term investment to develop local expertise & generate coordinated & accessible datasets.
- Practical field-based training suitable for a generalist workforce supplemented with specific skill development & tools, e.g. river condition assessment kits.
- Development of strong linkages with education & research providers at education & industry levels to attract people to work in the science of Alps water & catchments.
- A coordinated approach to recruitment, development & retention of expertise & skills relevant to Alps water & catchment management priorities.
- Involvement with government & industry water initiatives to boost capacity in Alps water & catchment management expertise & skills.

Photos: Spencers Creek – Lynda Weston, Fire at Dairers Gap – Dave Woods

AUSTRALIAN ALPS NATIONAL PARKS

[1] Australian Alps Liaison Committee Water & Catchments Reference Group www.australianalps.environment.gov.au email: anthony.evans@environment.nsw.gov.au ☎ (02) 6450 5507

APPENDIX II – Survey Form

AALC – Australian Alps rivers and catchments skills survey:

Your Name:

Agency/organisation:

Position:

Best email/phone contacts:

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1. Do you believe there are appropriately skilled or experienced specialists available in your area of management to meet the current objectives of your agency with respect to Australian Alps rivers, catchments and climate change issues?

☐Yes ☐No ☐ Don't know

If you answered 'No', please provide further information:

Comments:

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2. Can you identify or specify **three** key issues relevant to Australian Alps rivers and catchments that you are managing or working, where a shortage of skills or expertise is of a concern to you, in decreasing order of significance:

a

_____

☐

b.

_____

☐

c._____

_____

☐

For each issue, please **rate** your degree of concern, by placing a number in the box for each (above) corresponding to this rating scale:

1. *skills /expertise can be resolved quickly, within a month or two.*
2. *skills /expertise are a problem, can be resolved within a year.*
3. *skills /expertise not able to be resolved in a satisfactory timeframe – in the "too hard" basket.*

Comments:

3. Do you think the existing recruitment and management services of your agency, including learning and development programs, will be able to adequately address skill and expertise requirements in relation to Australian Alps rivers, catchments and climate change?

☐ Yes ☐ No ☐ Don't know

If 'No, please provide further information:

4. Do you think retention of contractors and/or external expertise could assist you with skill and expertise requirements in relation to Australian Alps rivers, catchments and climate change issues?

☐ Yes ☐ No ☐ Don't know

Comment:

5. Have you been directly involved in recruiting specialist staff in relation to rivers, catchments and climate change issues, either internally or outsourcing?

☐ Yes ☐ No

Comment:

If you answered ***yes*** to **question 5**, did you experience any problems in recruiting specialists?

☐ Yes ☐ No

If you answered **yes**, did you experience any of the following problems?

☐ Delay filling the position – of a month or more.
☐ Could not fill the position on the first attempt.
☐ Multiple attempts to fill the position – without success.

Comment:

Thank you for participating in this survey.

The results will be provided to the AALC and to participants.