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Dr Hanna Jaireth
Secretary
Standing Committee on Climate Change, Environment and Water
ACT Legislative Assembly
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ACT Greenhouse Gas Reduction Targets

Dear Dr Jaireth

The Institute for Applied Ecology (IAE) at the University of Canberra is a research institute that produces work of international standing. IAE staff and associates contribute to the understanding and improved management of species, communities and ecosystems in Australia and internationally, with particular reference to the effects of human activity.

The IAE has provided governments, communities and businesses with solutions to complex ecological problems, resulting in improved management of rare and endangered animal species and invasive pests and the development of novel approaches to assessing river health. More generally, IAE research has contributed to land conservation and enabled better approaches to land use and development.

This short submission provides overview remarks about key issues affecting the humans and biota of the ACT, some suggested approaches and specific comments about existing ecological communities.

Climate change is a complex problem, in fact a ‘wicked problem’. It features incomplete, contradictory, and changing requirements and complex interdependencies. There may not be solutions now but steps towards solutions inevitably involve changes in the behaviours of large groups of people.

The main issue is that change is upon us and our responses now will determine the future of life in the region. The potential for life and quality of life for human and all other life forms

will be affected. We can influence the severity of impact by recognising and adopting appropriate strategies. The government, industry and the community need to come together to plan how the ACT will adapt to that change.

Close to our hearts, the government, industry and the community need to plan how the ACT is going to moderate the challenges faced by the biota, particularly but not just, threatened species, in adapting to climate change. Major contributions to this task will be maintaining the integrity of natural ecosystem patches and connectivity between them so that the biota have the opportunity to respond to climate change in the ways that they have in the past. In some cases, this will require assistance and investment, where that capacity has already been compromised by habitat fragmentation and degradation or the introduction of new demographic pressures and exotic species.

Water supply, quality and use will be at the heart of changes required in the ACT. The frequency and duration of extreme weather events is increasing. Drought, firestorms and floods, are already increasing in intensity and severity and causing desertification, erosion and changes to ecosystem dynamics that may not be reversible. Rainfall less predictably distributed and falling more often in very heavy storm sets will erode catchments, often left bare through failure of land practices to adjust to the changed climate regime. These changes create problems for water quality and catchment management as well as for stormwater management. The biota in and around catchments will alter in response to these events and we cannot predict now what those changed environments will look like. However, such changes are highly likely to be crucial for the maintenance of aquatic biodiversity and ecological function. We rely heavily on healthy functioning aquatic systems to supply good quality water at low cost and to improve the quality of water discharged from urban areas and sewage treatment plants. Degradation in such systems because of climate change will lead to increased water treatment costs and potentially more serious effects of discharges.

Augmented water supply needs are already seeing actions that will result in increased greenhouse gas emissions. These include the considerable energy costs of pumping to the Stromlo treatment plant, pumping to Googong Dam from Stromlo and soon, pumping from Angle Crossing to Burra Creek. It has also been well established in Canadian studies that recently drowned storages, such as the enlarged Cotter Dam, are a major source of greenhouse gases through the decomposition of submerged organic material. The proposal for water re-cycling from treated sewage effluent will also have significant energy costs.

What can the ACT do, as a community of good global citizens, to maintain or reduce its contributions to emissions? Personal action by our citizens is useful, but there are limitations to this. Its greatest benefit is to build and consolidate constituency behind the need for action, but that action needs to come from government. We did not solve the ozone problem by expecting well minded citizens to change over from CFC's, we mandated it, as we did for catalytic converters in cars.

We see an ACT that is committed to population growth and economic growth while maintaining or reducing its footprint on the environment, of which emissions are but a part. We ought to be moving toward this ideal, in how we manage our transport, our power consumption, our buildings, and other infrastructure, our acquisitions and our water supply.

We see an ACT where developmental proponents are required to show that they will not be increasing the footprint of the ACT, including emissions, either by innovative designs that improve on what they are replacing or through effective offsets.

We see an ACT where improved efficiencies in housing and transport, water use, and the workplace allow population growth without increasing the footprint of the ACT on the environment.

We see an ACT that accepts resources are both limited and limiting. Water and energy are clearly two such resources that must be used more efficiently to avoid possible severe restrictions on economic growth and social quality.

Even if we act immediately, some level of climate change is inevitable. In conjunction with the actions already noted we see an ACT that actively engages in modifying current behaviour and management to adapt to the current and expected levels of change. More intense and frequent drier periods, fires and floods will require different approaches that have served us in the past. This adaptation will be needed to minimise the effects and sustain the current environmental resources to support our future.

The government needs to commit to this concept of sustainable society by the adoption of clear and achievable targets, including the ultimate target of zero growth in emissions. These targets can be realised by commitment to real change, specifically to the way we organise our transport (related to density of housing), industry, buildings, housing, heating and services.

Of course, the measure of our footprint must include contributions made beyond our borders—electricity consumption generates emissions in NSW. Constraints applied in the ACT must not be allowed to be undermined by stimulation of counterproductive developments in Queanbeyan. Water supply is now being extended to NSW and may have interacting impacts with water use far afield as the lower Murray-Darling Basin.

Climate change impacts on the sustainability of existing ecological communities

Impact of invasive animals and plants under climate change

Australia has many freshwater and terrestrial animal pests that threaten a wide range of native plants, animals and communities as well as the viability of agriculture. There is concern that new pests could be imported and establish. A strict protocol has been developed to assess the potential for new pests to establish in Australia based on risk assessment and incorporating climate matching models. Many existing pests have not reached their full distribution but more worrying, their distribution and the damage that they cause may expand significantly under climate change predictions. Australia and the ACT need new tools and processes to ensure that we can appropriately assess the risk from importing new animals while planners and managers need predictive tools and processes to plan and implement appropriate management programs to meet the challenge from existing pests. The Invasive Animals CRC at the University of Canberra works cooperatively with all the groups involved in this work and has a major program on Detection and Prevention of new and existing pests. The University of Canberra has developed DNA micro-techniques that can detect animals at low density. These are essential to monitor the success of eradication programs and to detect the spread on pests at the margins of their distribution where conventional techniques often fail. The UC micro-detection technique has successfully detected foxes at very densities in

Tasmania and has been an invaluable in developing appropriate management strategies for eradicating foxes. The same strategy could be applied modified and applied to other pests.

The development and use of the ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality was based on the philosophy of applying risk based trigger values, set locally based on ambient [or average] conditions. Implicit in this approach was the use of existing water quality data sets that don't reflect conditions likely to prevail as a result of global climate change. The veracity of such an approach in a climate in which the frequency of extreme events increases is unknown. The framework of the guidelines provides that guideline values can be tailored to suit local conditions based on local data. However, a significant information gap exists where data from extreme events are not available and because of the nature of such events, relevant data are often not collected. Thus modelling and prediction of water quality as a result of expected climate change is essential to fill this significant information gap. Future sustainable water planning demands that the consequences of extreme events for both water quantity and water quality are taken into account.

The focus of water planning under climate change scenarios in Australia has, to date, been on the quantities of water involved and little, if any, research has investigated the implications of a changing climate for water quality. Central to 'sustainable' water planning is the recognition that water quality, at both the supply and discharge points of the water cycle, is an integral component of the planning process *i.e.* there is a direct cost implication associated with water quality.

The possible ecological outcomes of these changes to rivers and lakes are not understood. However, it is possible that temperature increases during extended dry periods will result in crossing ecological thresholds. Such changes can result in changes in ecological state that may be difficult to reverse. For example, shifts from clear bottom streams to ones choked by plant growth that alter flows, nutrient processing, habitat and biota. Alternatively, extensive algal blooms reminiscent of those in 1994 in the Darling River and the current Murray River infestation. The eWater CRC and the Institute for Applied Ecology at the University of Canberra and the Capital WATER collaboration between ANU and UC are undertaking research to address these issues. Such work will have local and national implications.

Finally, if the government does not bite the bullet on this now, and chooses to leave it to future governments, our options will be fewer and many undesirable constraints may be forced upon us—one can see this ultimately happening with transport. If we move now, we will have more control over the Canberra of the future.

Yours sincerely

Richard H Norris.

Professor Richard Norris
Director