**Table of Empirical Studies on Community Perceptions of Environmental Flows**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Type of Article** | **Author/s** | **Title** | **Year** | **Journal** | **Group Explored in Study** | **Study Location** | **Methodology** | **Study Findings/Arguments** |
| Journal Article | Assumpcao, Jonoski, Theona et al | Citizens’ Campaigns for Environmental Water Monitoring: Lessons from Field Experiments | 2019 | IEEE ACCESS | General Public | Romania and Greece | Field Experiment to test the effectiveness of a new app in monitoring citizen acquired data in water management Two case studies. Provided apps to citizens to collect data on environmental water management. | Successful in terms of collecting some environmental water data. Gamification increased engagement, however sustaining engagement was difficult. Suggests reframing work as an experience in nature. |
| Conference Proceeding | Bjornlund et al. | Water reallocation politics: public perceptions | 2011 | WIT Transactions on the Ecology and Environment | General Public | Lethbridge, Canada | Interviews of the public; 2 studies: Study 1 grouped respondents into value clusters then asked about policy questions. 2. Value statements applied factor analysis , n = 1170 | Values play a significant role in acceptance of water allocation policy in Southern Alberta. Urban/Rural divide not stark, often based on other complex factors such as age, industry, level of education. |
| Journal Article | Bjornlund et al. | Policy Preferences for water sharing in Alberta, Canada | 2013\* | Water Resources and Economics | General Public | Alberta, Canada | Mail-out surveys to the general public ( n= 1993). | Findings indicate that those that live in urban areas are more likely to prioritize the environment in their assessment of water sharing. They are also more accepting of government control of these resources. Those in rural areas tended to support policies that protect existing rights to water. |
| Journal Article | Bjornlund et al | Segmenting the Urban and Rural Populations of Southern Alberta for Improved Understanding of Policy Preferences for Water Allocation | 2013 | Society and Natural Resources | General Public | Southern Alberta, Canada | Mail out surveys of the public (n = 1170) using value statements. (Linked to same study as Bjornlund (2011)) | People residing in urban areas are more likely to hold pro-environmental views than those in rural. Those in rural areas express strong pro-environment values if they are directly affected by the issue, but this shifts to a utilitarian point of view if their broader community is affected. |
| Journal Article | Bjornlund et al. | Generational differences in policy preferences for water sharing: implications for the future | 2014 | WIT Transactions on Ecology and the Environment | General Public | Southern Alberta, Canada | Mail-out surveys of the public (n=1993). Same study as Bjornlund (2013)\* | Looked at age differences to determine support for water policies. Support for environmental policies decreased as the survey cohort increased in age. Also reported in Zuo et al. (2015) |
| Journal Article | Conroy et al. | Consequences of changed water management for Aboriginal Australian in the Murrumbidgee catchment | 2019 | Australian Geographer | Indigenous groups | New South Wales, Australia | Focus group and interviews on perceptions of water management in Aboriginal communities. Focus groups: 3 groups (10 people in each); Semi Structured individual Interviews (5 in total) | High ecological degradation was leading to loss of cultural identity. Environmental water planning creates false dichotomy between environmental and cultural values. Water ownership has potential to add to dispossession. Environmental water can restore cultural important places but will only benefit community if equitable access is allowed. Access not considered part of enviro water mgmt. |
| Journal Article | Graham | Irrigators' attitudes towards environmental flows for wetlands in the Murrumbidgee, Australia | 2009 | Wetlands Ecology and Management | Irrigators | New South Wales, Australia | Focus Group measuring irrigators' perceptions of enviro water. 3 Focus Groups of 3 hrs each. N = 19. Use of app to model flows down river, giving participants the opportunity to see how this changes enviro factors. | The effectiveness of environmental water releases were a large factor in farmers' acceptance of scheme. Many believe the environmental impacts have not been proven. |
| Journal Article | Jackson et al. | Public attitudes to inequality in water distribution: insights from preferences for water reallocation from irrigators to Aboriginal Australians | 2019 | Water Resources Research | Irrigators  Indigenous Groups | Various locations in Australia | Survey to irrigators and Aboriginal Australians. n = 2,699 ; 9.5% response rate. Online questionnaire asking about 1. willingness to allocate irrigation water to aboriginal use, 2. same as 1, except federal gov needs to pay, 3. willingness to pay for this allocation transfer | Approx. half of irrigators(44% and 49% depending on whether they were given further information) were willing to allocate percentage of irrigation water to Aboriginal community. Dropped to 32% support when it meant cost to federal government. Dropped further to 28% when there is a willingness to pay element. |
| Conference Paper | Loo et al. | “Does anyone here speak water-ish?” – How the benefits of environmental flows get lost in translation | 2017 | 9th Australian Stream Management Conference (Hobart, Tasmania) | General Public  Irrigators  Interest Groups  Indigenous Groups | Victoria Australia | Survey to determine level of understanding and support for, environmental water in general public, irrigators, interest groups and Aboriginal Victorians (n = 1,590). | Minimal understanding amongst public respondents (17%) regarding what environmental water is and its benefits. Terms being used to convey information on environmental water are also not well understood. Irrigators more likely than other groups to believe in negative effects of environmental water. 64% of respondents stated they were neither for nor against environmental water. |
| Journal Article | Lane -Miller et al. | Acquiring Water for the Environment: Lessons from Natural Resources Management | 2013 | Journal of Environmental Planning and Management | Irrigators | Various locations in the United States of America and Australia | Review of existing literature and desktop analysis of buybacks. Comparative case study of the US and Australia. | Values related to land, family, lifestyle and community have a large influence on decisions to participate in an enviro water buyback scheme. In the US, NGOs help to increase willingness of irrigators to sell water through buyback schemes through cultivating trust. |
| Journal Article | Loch, A et al. | Using proportional modelling to evaluate irrigator preferences for market-based water reallocation | 2016 | Agricultural Economics | Irrigators | Various locations in Murray-Darling Basin, Australia | Mail out survey to Irrigators (n = 535) to determine how Environmental Flows budgets should be spent, using a preference-based approach. \*Same study as Loch, 2014, | Considers budget expenditure preferences of Irrigators. Irrigators that do not rely on water for productive use, have a greater preference for market-based environmental water recovery than those that do. Other factors also influence these findings includes level of farm debt, income, reliance on water,. |
| Journal Article | Loch, A et al. | Irrigator preferences for water recovery budget expenditure in the Murray-Darling Basin, Australia | 2014 | Land Use Policy | Irrigators | Various locations in Murray-Darling Basin, Australia | Mail out survey to Irrigators (n = 535) to determine how Environmental Flows budgets should be spent, using a preference-based approach. \*Same study as Loch, 2016. | Asks irrigators to preference water recovery programs: water entitlement purchases, infrastructure investments and irrigator exit packages). Study found that irrigators preferred to allocate most budget to upgrading infrastructure, and water entitlement purchases. |
| Journal Article | Lukasiewicz et al. | Is the environment getting its fair share? An analysis of the Australian Water Reform Process using a Social Justice Framework | 2013 | Social Justice Research | Decision-Makers  General Public  Indigenous Groups | New South Wales and South Australia, Australia | Content analysis of key water reform documents and semi-structured interviews with stakeholders (n = 61). | Analysis of documents showed that priority of allocation has shifted from environment to ‘critical human needs’. Government managers saw environment as an ecosystem, in contrast to general public, who saw it as an amenity to be enjoyed. |
| Journal Article | Lukasiewicz & Dare | When private water rights become a public asset: stakeholder perspectives on the fairness of environmental water management | 2016 | Journal of Hydrology | General Public  Irrigators  Decision-makers | New South Wales, Australia | Interviews of participants of New South Wales Environmental Advisory Group (n=38). | Two key factors influencing community perceptions: 1. Perceived inequitable distribution of burdens and benefits of environmental water delivery, eg. Flooding 2. Historical process of environmental water acquisition. For example, sense that there have previously been too many water buyback schemes. Would like to directly observe the impacts of enviro water. |
| Journal Article | Mott -Lacroix et al. | Building common ground for environmental flows using traditional techniques and novel engagement approaches | 2016 | Environmental Management | General Public  Indigenous Groups  Farmers | Arizona, United States of America | Focus groups: 43 groups, n = 226. Selective sampling of interested organisations and parties. | High level of concern for water security. The group that most wants water to be allocated to the environment is the Indigenous group followed by government. The least are the 'ranchers'. |
| Report | Murray -Darling Basin Authority | Murray-Darling Basin community and water license holder market research: Report on water information and communications requirements | 2021 | NA | Irrigators  General Public | South-eastern Australia (Murray-Darling Basin) | Focus groups, interviews and surveys of irrigators and general public regarding water management 16 online focus groups, 26 individual in-depth interviews, 7 paired interviews, total = 115  Telephone survey with license holders n = 300; online survey with basin community = 639. | Limited knowledge in the basin community (56%) on environmental water, its allocation, why it is important, what the benefits/positive outcomes have been. 29% of basin community were not satisfied with current information on environmental water. 33% of water license holders were not satisfied with current info on environmental water.  Drop in agreement over time among basin community (42% in 2021; 64% in 2018) that the Murray-Darling Basin Plan will improve environmental health in basin. |
| Journal Article | Mendham and Curtis | Local stakeholder judgements of the social acceptability of applying environmental water in the Gunbower Island forest on the Murray River | 2018 | Water Policy | Irrigators  Farmers  General Public | Gunbower Island, Australia | Paper survey delivered by hand to local residents. Responses of n = 279 (representative of the area) Uses social psychological approach to measure acceptability of enviro water through lens of values, trust, relationship to environment. | 36% of respondents did not agree that the benefits of enviro water outweighed its drawbacks, with 33% unsure. Overall negative response. Most negative judgments were from farmers, non-town people, non-walkers. |
| Journal Article | Nikolakis et al | Indigenous values and water markets: Survey insights from northern Australia | 2013 | Journal of Hydrology | General Public  Indigenous Groups | Various locations in the Northern Territory, Australia | Face-to-face surveys of Indigenous (n=37) and non-Indigenous (n=83) stakeholders. | Generally, respondents (Indigenous and Non-Indigenous) were not in favour of tradable environmental flows. Concerned about economic interests taking importance over environmental benefits. |
| Thesis | Parrack | The Influence of Stakeholder Values on the Acceptance of Water Reallocation Policy in Southern Alberta | 2010 | PhD Thesis | General Public  Irrigators | Southern Alberta, Canada | Mail-out survey (n=460) to general public and irrigators on perceptions of water allocations. | Separated all in clusters of rural/urban, and pro-enviro/pro-economic. Pro-enviro were most prominent among urban people, rural residents less likely to express pro-enviro values. Pro-economic values were a minority in this research (in contrast to other studies). Rural more supportive of local irrigation sector than urbanites. rural moderate cluster (equal pro-environ/econ) would like to honour water licenses despite economic or enviro situation changing. All agree that there should be a set min flow for rivers, and only flows above this can be used for economy. |
| Journal Article | Syme et al. | Defining the components of fairness in the allocation of water to environmental and human uses | 1999 | Journal of Environmental Management | General Public | Various locations in Australia | 7 studies over 10 years in perceptions of water allocations. Comparative longitudinal survey to general public. | Respondents in the community highlighted the importance of fairness, and a right to have a say over water allocations. They also highlighted that water markets are not fair or equitable for allocating water. |
| Journal Article | Wheeler et al. | Australian irrigators' recognition of the need for more environmental water flows and intentions to donate water allocations | 2014 | Journal of Environmental Planning and Management | Irrigators | Various locations across South-Eastern Australia | Longitudinal survey to Irrigators n = 1,314. Three points in time: 1998, 2005, 2010. Different survey methods: mail out surveys in first go, phone survey in second. | Found that there was a significant relationship between an irrigator's recognition of the problem of enviro water and their willingness to give up a bit of allocation. Recognition was highest in 1998 (60%), dropped to 35% in 2005 and then rose to 44% in 2010. Intention to donate halved further in each round. |
| Journal Article | Wheeler et al. | Water policy debate in Australia: Understanding the tenets of stakeholders’ social trust | 2017 | Land Use Policy | Irrigators | Various locations in Murray-Darling Basin, Australia | Mail out survey to Irrigators (n = 535) surveyed using a best-worst scaling methods approach. | Found that there is limited trust between irrigators and the Murray Darling Basin, but also between irrigators and other people. Irrigators feel that they are unfairly expected to shoulder the burden of water reforms. |
| Journal Article | Wineland et al. | Is there enough water? How bearish and bullish outlooks are linked to decision maker perspectives on environmental flows | 2021 | Journal of Environmental Management | Decision-makers | Texas and Oklahoma, United States of America | Online survey (n= 24) to natural water decision-makers. | Separated people out into bearish and bullish outlooks. Largest difference between two clusters was based on stakeholder's willingness to participate in an enviro water program. Bearish cluster ranked this as least important while bullish ranked it as second most important. |

Reference list

Assumpcao TH, Jonoski A, Theona I, Tsiakos C, Krommyda M, Tamascelli S, Kallioras A, et al. (2019) Citizens’ Campaigns for Environmental Water Monitoring: Lessons From Field Experiments. *IEEE Access* 7: 134601-134620.

Bjornlund H, Parrack C, De Loë RC (2013a) Segmenting the Urban and Rural Populations of Southern Alberta for Improved Understanding of Policy Preferences for Water Reallocation. *Society & Natural Resources* 26: 1330-1350.

Bjornlund H, Xu W, Zhao X (2014) Generational Differences in Policy Preferences for Water Sharing: implications for the future. *WIT Transactions on Ecology and the Environment* 178.

Bjornlund H, Zuo A, Parrack C, Wheeler S, De Loë R. (2011) Water reallocation policies: public perceptions. In: *WIT Transactions on Ecology and the Environment*, ed. C Brebbia and V Popov, pp 585-596. Southamption, Boston: WIT Press.

Bjornlund H, Zuo A, Wheeler S, Xu W, Edwards J (2013b) Policy preferences for water sharing in Alberta, Canada. *Water Resources and Economics* 1: 93-110.

Conroy C, Knight AR, Wassens S, Allan C (2019) Consequences of changed water management for Aboriginal Australians in the Murrumbidgee catchment, NSW. *Australian Geographer* 50: 169-184.

Graham S (2009) Irrigators' attitudes towards environmental flows for wetlands in the Murrumbidgee, Australia. *Wetlands Ecology and Management* 17: 303-316.

Jackson S, Hatton Macdonald D, Bark RH (2019) Public Attitudes to Inequality in Water Distribution: Insights From Preferences for Water Reallocation From Irrigators to Aboriginal Australians. *Water Resources Research* 55: 6033-6048.

Lane-Miller CC, Wheeler S, Bjornlund H, Connor J (2013) Acquiring Water for the Environment: Lessons from Natural Resources Management. *Journal of Environmental Policy & Planning* 15: 513-532.

Loch, A., Boxall, P., Wheeler, S.A., (2016) Using proportional modeling to evaluate irrigator preferences for market-based water reallocation. *Agricultural Economics* 47: 387–398.

Loch, A., Wheeler, S., Boxall, P., Hatton-Macdonald, D, Adamowicz, W.L., Bjornlund, H. (2014) Irrigator preferences for water recovery budget expenditure in the Murray-Darling Basin, Australia. *Land Use Policy* 36: 396-404.

Loo S, Penko V, Carpenter K. (2018) “Does anyone here speak water-ish?” - How the benefits of environmental flows get lost in translation. In: *9th Australian Stream Management Conference*, Hobart, Tasmania.

Lukasiewicz A, Dare M (2016) When private water rights become a public asset: Stakeholder perspectives on the fairness of environmental water management. *Journal of Hydrology* 536: 183-191.

Lukasiewicz A, Syme GJ, Bowmer KH, Davidson P (2013) Is the Environment Getting Its Fair Share? An Analysis of the Australian Water Reform Process Using a Social Justice Framework. *Social Justice Research* 26: 231-252.

Mendham E, Curtis A (2018) Local stakeholder judgements of the social acceptability of applying environmental water in the Gunbower Island forest on the Murray River, Australia. *Water Policy* 20: 218-234.

Mott Lacroix KE, Xiu BC, Megdal SB (2016) Building Common Ground for Environmental Flows using Traditional Techniques and Novel Engagement Approaches. *Environmental Management* 57: 912-928.

Murray Darling Basin Authority, Orima Research. (2021) Murray-Darling Basin community and water license holder market research: Report on water information and communications requirements. Canberra.

Nikolakis WD, Grafton RQ, To H (2013) Indigenous values and water markets: Survey insights from northern Australia. *Journal of Hydrology* 500: 12-20.

Parrack C (2010) The Influence of Stakeholder Values on the Acceptance of Water Reallocation Policy in Southern Alberta. Waterloo, Ontario, Canada: University of Waterloo.

Syme G, Nancarrow B, McCreddin JA (1999) Defining the components of fairness in the allocation of water to environmental and human uses. *Journal of Environmental Management* 57: 51-70.

Wheeler SA, Hatton MacDonald D, Boxall P (2017) Water policy debate in Australia: Understanding the tenets of stakeholders’ social trust. *Land Use Policy* 63: 246-254.

Wheeler SA, Zuo A, Bjornlund H (2014) Australian irrigators' recognition of the need for more environmental water flows and intentions to donate water allocations. *Journal of Environmental Planning and Management* 57: 104-122.

Wineland SM, Fovargue R, York B, Lynch AJ, Paukert CP, Neeson TM (2021) Is there enough water? How bearish and bullish outlooks are linked to decision maker perspectives on environmental flows. *Journal of Environmental Management* 280:111694.