

# **Drought, Climate Change, and Colorado's Policy Discussion: Participation or Procrastination?**

John D. Wiener

## **1. The State Creates New Policy Discussion**

Water, drought and even climate change policy problems are attracting increasing attention, but actual response is not as clear. This presentation describes unease over the pace of discussion about rules of the game while play proceeds. In Colorado, as other Western Prior Appropriation water law states, the right to use water is a saleable private property right, though transfers may not injure other water rights (generally, see Getches 1999 for explanation). While anyone may discuss the impacts of water transfers (e.g. Howe and Goemans 2003, Western Water Policy Review Advisory Commission (WWPRAC) 1998), and the legislature may debate bills on impact mitigation (about 20 since 1988), business goes on..

Public participation in Colorado water issues increased dramatically with two innovative state-sponsored processes: the State-wide Water Supply Initiative, ("SWSI") and the Interbasin Compact Committee/Colorado Water for the 21st Century process ("HB1177" process). There are extensive websites for these, with reports, meeting minutes, and legislative actions, so this extended abstract will not elaborate. Please see <[www.cwcb.state.co.us/IWMD/](http://www.cwcb.state.co.us/IWMD/)> and select "general information and presentations" and "basin information" and "technical roundtables" for SWSI postings, including the Phase 1 report. For information on the Interbasin Compacts, and Basin Roundtables, please see <[www.dnr.state.co.us/](http://www.dnr.state.co.us/)> and select "Interbasin Compact – Water for the 21st Century". Previously, public participation was almost entirely in reaction to projects or regulatory actions. Water supply is planned by water providers, and in general the city council is the client, and because it is a competitive private markets, dealings and prices are often secret.

The first big change in water planning in Colorado may have been due to denial of permits to build the Two Forks Reservoir, decided in 1990, amid a great deal of frustration (see Rhodes, et al. 1992 for thorough description). Analysis of water politics is beyond this little paper or talk, so we will skip through the increasingly nervous 90s, with population growth bringing supply problems (WWPRAC 1998) and also unusually wet times in Colorado (Pielke et al. 2005, SWSI 2004 Report for background). By 2002, there was very serious multi-year drought in progress and great supply problems even for the very large water providers. The General Assembly (Colorado legislature) made several changes in water law to facilitate transfers, and fund the Statewide Water Supply Initiative process (SWSI).

The SWSI was intended to provide a common understanding of water supply and demand issues, but not to establish or support a state water plan (compare California Department of Water Resources 2005). In Colorado, it is often asserted that "prior appropriation is our water plan", and thoughtful people have argued that it allows the kind of incremental market-driven change which they say is better than centralized planning. (For simplicity this abstract will not cite who, which meeting and when; most of this is based on direct observation and notes made by the author if not cited.) "Private property!" is treated as negation of the idea of planning (Jacobs 2003). Colorado has no significant support for growth management planning (Godschalk 2004),

though "smart growth" as a term is in vogue. The water rights held by a farmer are frequently more valuable than the rest of the operation and assets, and one frequently hears, "It's my 401(k)!" In a period of agricultural economic stress (with the shining very recent exception of the ethanol boom), this is very serious business. Also, water providers frequently insist that getting water as cheaply and securely as possible is their job, (e.g. in SWSI meetings) though it is less fashionable to talk of cooperation and collaboration. This little paper is about why that might be. There is not and will not be state water planning here.

## **2. The problem: here comes trouble, but we're not looking (in public).**

The SWSI did a superb job of identifying the "gap" between water supply and water demand in Colorado, focusing on 2030, with some severe limitations on the study. One was taking at face value the water provider claims of projects and processes in progress to meet demands, however probable their success; this has been recognized (see SWSI reports, and forthcoming Phase II reports). Another was not considering climate change and cumulative impact limits on water transferability. The 538 page 2004 report uses the word "climate" 35 times (thank you, adobe acrobat™ software!), but long-term climate change is mentioned only in one table as a factor that might increase or decrease water availability, and in regard to only two river basins; this may reflect submission of extensive comments on climate change issues (available from author) to those two basin roundtables, with oral support. Even with these limitations, the report established that competition for water will sharply increase. The SWSI project used representatives from a wide variety of water interests in Basin-specific Roundtables, following contemporary planning practice. The "bottom-up" process did a great deal to legitimate the project and the results. In Phase II, technical round-tables were convened with broad interest representation but the intent was much more to identify issues and answers in three particular areas (final reports should be posted before July 2007). The "HB1177" process established permanent Basin Roundtables representing specified constituencies, to build on SWSI, refine assessment of supplies, demands, and possibilities in-basin, and create "interbasin compacts". This is to help resolve conflicts and set water policy, but it is not entirely clear how. The severe impacts on local economies from which water has been transferred underlie a great deal of the conflict in water issues (see SWSI report, Howe 2000, WWPRAC 1998) and impacts on local and regional environments are also a concern (SWSI), though less accepted.

There is no "new water" left, in practical terms, so agriculture to urban transfers will be needed, and the extent will be affected by not only the rates of growth of urban populations, and all the normal factors well-described in the SWSI process. There will also be serious impacts on supply and demand – scarcity – from climate change, including increased drought (a few notes on this below). And, there will very likely be reductions of water that can be transferred from agricultural sources because of cumulative impacts that will achieve legal force under the Endangered Species Act, (ESA) or Total Maximum Daily Loads (TMDLs) of pollutants or water quality standards. To meet space limits I leave the substance of these not-really controversial arguments to the references cited, and will just note a few tips of these icebergs.

Cumulative impacts are not examined in water transfers in Colorado, and only very recently has there been authorization for a Water Court (which must adjudicate almost all changes of use of water rights) to even consider any impacts of a large transfer on anything except other water

rights. Meanwhile, with each transfer away from rural and agricultural uses, the water landscape changes, and cumulative changes increase.

"The rules governing water transfers from agriculture to municipal uses are one place the ESA's pressures will surely be felt." (Doremus 2001: p 410.) Colorado, Nebraska and Wyoming have just finished agreement on a very expensive plan for Platte River Recovery (Bureau of Reclamation 2006). There are plenty of other examples, including Colorado River ESA programs, California Bay-Delta programs, Columbia River Basin programs, Rio Grande programs... The SWSI study does not ignore the ESA, but Colorado does not have a program of early detection and warning for forthcoming ESA problems, and in fact, water leadership may regard the ESA as a nuisance to work around (my interpretation from Colorado Water Congress annual meetings 2001, 2002, 2004, 2005, 2006, 2007 – attended and notes reviewed for this presentation).

Changes in water quality from transfers and associated management is another source of cumulative impact problems. In pursuit of water quality affected by non-point-source pollution and changes, Total Maximum Daily Load standards are increasingly imposed; see [www.epa.gov/owow/tmdl/intro.html](http://www.epa.gov/owow/tmdl/intro.html) for the basics. The traditional and entrenched separation of water quality issues from water quantity issues has kept a great deal out of sight. But, as changes cumulate, trouble is coming (Doremus 2001, for example). One of the threats is that salinity increases may prompt down-stream states to seek standards (Kansas is often mentioned, since there is already a huge and expensive effort on the Colorado River to reduce salinity.)

Climate change will interact with unconsidered cumulative impacts and not planning. In 1992, Rhodes et al. observed (p. 11) that the science showed there could be "large changes in the regional and seasonal distribution of precipitation and runoff...". Readers may find a 1991 story by Stevens ironic in its summary of expectations then, compared to now. Jumping 15 years, the Fourth Assessment by the Intergovernmental Panel on Climate Change confirms previous assessments, adding new empirical evidence from observed change as well as improved modeling. "It is very likely that hot extremes, heat waves, and heavy precipitation events will continue to become more frequent" (Working Group I Summary for Policy Makers, p 16), with changes in run-off, droughts, snow storage of water, decreasing snowpack in the Western mountains of North America with reduced summer flows, and warmer and fewer cold days and nights, and more hot days and nights (Working Group II Summary for Policy Makers). Specifically for the Western US, there is a huge literature on hydroclimatology, but the most interesting point for this argument is how little the expectations have changed (this will be shown in excruciating detail in the new IPCC reports, again). For older views, see AWRA volumes, Adams Ed. 1999, and Herrmann Ed. 1992, showing climate awareness outside Colorado.

For the Western US, integrated assessment of "best case" scenarios for climate change described by Barnett et al.(2004) shows that current water management systems are already seriously threatened. Edmonds and Rosenberg's group report that under all of the scenarios, with higher or lower precipitation, irrigation water use declines, even with strong growth in yields and no fossil fuel constraints on energy or agricultural inputs feedstock, and without competition for water (Edmonds and Rosenberg 2005: 155, and Rosenberg and Edmonds 2005). The biggest changes

will be in the semi-arid and arid West and Midwest, including increased variability if there is drying. Agricultural water is in trouble from climate.

An earlier series of climate impact assessments for the U.S. Global Change Research Program (Gleick et al. 2002, Ojima et al. 2002, Reilly et al. 2002, 2003, Wagner Ed. 2003) strongly support increased flexibility. (See also Herrmann Ed. 1992, and Adams, Ed., 1999 for American Water Resource Association conference proceedings.) We also face additional risks from more severe and frequent extreme events (Kim 2005). For better or for worse, the East side of the Rockies is one of the areas of strongest agreement among the models (Ojima et al. 2002) and there is no apparent change in the forthcoming IPCC 2007 reports (see Summaries for Policy Makers and later releases, available on <[www.ipcc.ch/](http://www.ipcc.ch/)>). In fact, expectations of trouble for this area are stronger than ever. But, there are still different views of climate change or its implications, such as those of Colorado State Senator Harvey, who said, on April 27th, 2007, "I believe there is a concerted effort by many environmentalists in the world to do us harm because they don't want us to have the greatest country in the world be the United States." Professor William Gray said, "This is driven by the scientists getting money to study it." (Hartman 2007).

The Colorado Water Congress (<[www.cowatercongress.org](http://www.cowatercongress.org)>) is "the stomping ground of the water buffaloes", and rightly boasted of its success in influencing water related bills in the legislature as well as its role as unified voice for Colorado water in federal affairs. It is, in my opinion, the best view of water politics an outsider can get, and in a private competitive oligopsony, almost everyone is an outsider. I must add my respect and affection for most of the "buffaloes", who have largely done great and ethical public service, but it is the sad mission of this paper to raise a nasty question about who is served by not looking at some problems. This group is an important barometer since water providers look to the largest and most professional providers for guidance (Rayner et al. 2006).

A review of too many pads of notes from meetings showed that in 2005 there was a mention, which sank with no apparent impact, of climate change as a factor in water issues in Colorado, (by John Stencil of the Rocky Mountain Farmer's Union in a Water Congress panel discussion of a couple dozen water leaders). Before that, I found no mention (and I was avidly listening for one). In 2006, there was almost a mention, but not quite. In 2007, in sharp contrast, there were whole sessions and important presentations on climate change at many water and agriculture meetings. What took so long for this to be part of public discourse by leadership?

Drought planning and response is also part of the picture, though this big topic can only be sketched. As far as policy affecting individuals, US Department of Agriculture documents addressing climate change and water issues must have escaped my searches. The only document found so far is Dobrowolski et al. 2005, the report of the Agricultural Water Security Listening Session meeting, and it is far more concerned with other pressures. But it does acknowledge climate change. As far as policy affecting water providers and public agencies, there is acute awareness of the science in NOAA research, and the National Drought Mitigation Center, and the new National Integrated Drought Information System (forthcoming, recently authorized), but very little implemented action. Drought response in this author's opinion continues to be driven by the unspoken assumption of "things will return to normal, and normal is not a drought". The most important progress in changing thinking is probably the wide-spread acceptance of "paleo-

drought" studies as an alternative basis for believing that climate can be different; see the websites of the CLIMAS, Climate Impacts Group, and Western Water Assessment NOAA projects (accessible through < [www.climate.noaa.gov/cpo\\_pa/risa/](http://www.climate.noaa.gov/cpo_pa/risa/)>). The SWSI report (and many meetings) showed water provider interest in such evidence as dendro-chronology showing serious multi-decadal droughts in the past. But this is not public acceptance of climate change, although for some it may have been a strategic substitute for some purposes, justifying a more serious response to the Drought centered on 2002 (Pielke et al. 2005 define that event in severity). Generally, drought responses (e.g. relief, disaster assistance, see USDA for press releases, for examples) are "restoration" of prior conditions as much as the funding allows, which must presume "things will get back to normal", and there is the least possible change to conditions and trends (obviously, this is a whole argument in itself, too big to make here; see USDA's "Farm Bill 2007 Theme papers", posted on USDA website for great information). Response to drought is not response to climate change if it is restoration to vulnerability, but it might serve other purposes.

### **3. The black box of water deals in Colorado.**

So, trouble is coming, in cumulative impacts and in climate change, and in their ugly and inexorable interactions. And, in water policy, we're not looking like we're looking. Why not? And so what? The problem is that not acting to respond does not mean that nothing is happening. We're talking more than ever about changing the rules, but the game is still being played. There is no "no action alternative".

Water sales are not public, despite the public interests involved. There is public notice in Colorado only when a change in use or place or timing of use of water rights is sought. The water may be legally committed with no public disclosure. And the price paid may never be public knowledge, which means that price discovery is profoundly skewed. Compare this to real estate, which is also utterly place-specific. People read about house sales in the Sunday papers, and the prices paid are public. There are good reasons for that, and why they don't apply to water is a mystery to me, except that water is treated as personal rather than real property (but there are still tax consequences of sales). Water providers are audited for quality, but not for quantity; why not? (Dr. Edna Loehman's astute question.) SWSI indirectly notes impending problems for frighteningly large numbers of residents whose water supply is not secure (e.g. mining depleting groundwater), and this has been a concern for decades.

In the oral presentation there will be some fun with dramatic renditions of stories from newspaper coverage of secret deals, pre-dawn meetings and deliberate misinformation on prices paid, by public officials. Please read the Olinger and Plunkett 2005 stories of how secrecy and competition are sharply affecting water markets, and also affecting costs and benefits. "If a whole lot of money ends up in someone's pocket, it probably wasn't an accident." And, "if you are winning, you probably like the rules."

### **4. Participation?**

Judging by the standards for planning exercises and development of public policy with public participation, the SWSI and the HB 1177 processes are remarkably good. The "state of the art" recommendations when they are published are in the "Green Books" from the International City and County Management Association (So et al. 1986, Hoch et al. 2000; Burby 2003). In part, the

whole problem of water policy and water planning in Colorado has been converted to a policy formation process: we have this very high growth of demand with a limited supply (ignoring in public some problems), and we have not solved the water supply problem or built any big storage, so we have a policy problem. Some see the lack of public support for big storage as the problem, but others see the resistance and public distaste for de-watering large areas of agriculture as the problem (how large the areas will be is another problem). And public support for very expensive projects is needed, especially in a very severe fiscal situation. So, the SWSI and HB 1177 processes serve important goals of legitimation (Johnson et al. 2006) and policy re-discovery or development. This is a very good set of goals.

"When planners use consensus-building principles and techniques, they increase the likelihood that the resulting plans, programs, and public policy will be successfully implemented. ... When planners design, run, or participate in successful open, collaborative, participatory, and consensus-building processes, they make the machinery of democracy work better. Sometimes consensus building is used as a lubricant for making traditional democratic representative decision-making mechanisms run more smoothly. At other times it works as a solvent for dissolving impasses and conflicts between interests." Klein, 2000: 423. As consensus building, the process is especially valuable for combining the consideration of goals (what are the needs?) with means (what could be done?), and allowing them to influence each other, rather than treating the ends and the means as separate in the technocratic tradition. Goals are "evolving, contested, and inextricably linked with alternatives." (Willson et al. 2003: 361). "Discussion is the essential link between analysis and decision-making." (Willson et al. 2003: 366). "Planning well done organizes hope, enhancing our abilities to imagine our communities as we might yet really live in them, while planning done poorly diminishes what we imagine we can do, weakens our hope, and discourages action..." (Forester 2006: 447).

The stated intent of the authorizing legislation and the discussions of the projects, and throughout the meetings of both SWSI and HB1177 make clear that this is the goal – to create water policy with consensus as much as possible, to enable and implement actions and escape gridlock and reduce social and other damage (observation limited by travel to South Platte and Arkansas Basins for SWSI, 3 of the 4 technical roundtables for SWSI, and Arkansas Basin roundtable for HB1177 process). What could be wrong with that? Nothing, but is it sufficient? Most of the literature suggests that planning success depends in part on having meaning, as in influence on the outcome. The SWSI was entirely advisory, and the HB1177 groups are expressly given no power to impair any water right or ability to enter agreements or contracts... (C.R.S. 37-75-105(3)). There will be no obvious immediate impact, and meanwhile, parties seeking deals are continuing with business as usual. So is this planning in a normal sense? It is five years after the Drought of 2002 (at its worst), and we're talking about policy, but is that all that is happening?

## **5. Procrastination?**

Who is affected by delaying change in the rules, or resolution of conflicts, whatever it may be, including perhaps no change? There are three important hidden factors affecting the perception of scarcity and the perception of value of agricultural water. Markets work well only with sufficient information, and the secret competition and non-disclosure of prices in water sales almost certainly injures the many small non-engineer non-lawyer non-broker sellers more than the very few highly-professional water departments of big cities. Disregard of cumulative limit

problems is disregard of scarcity-increasing situations which should affect perception of future values. And, treatment of climate change and impacts as a political option rather than science similarly delays the market's recognition of factors that affect water values. If all of these factors did not seem beneficial to buyers and hurtful to sellers, it would be easier to suppose that this was not a known situation. Cities are known to be examining water supply needs in climate change (e.g. American Water Works Association Research Foundation projects, and other efforts), but this has not been well publicized (author's personal knowledge from participants in those projects) though it does not seem to be highly confidential. And there is just no credibility to the idea that some of the best water engineers in the world are not paying attention.

As well as changing prices and perceived values from public recognition of these factors, changes in the rules of the water game will almost surely include increased costs for mitigation of social impacts in areas of origin, and increased costs for revegetation and soil management in formerly-irrigated lands (cost information has so far not been revealed to me despite frequent requests; this is business...).

City water rate-payers have voted to spend about \$3.8 Billion in 110 elections in Colorado on open space, conservation, farmland preservation, and related projects (see "Conservation Vote" on website for Trust for Public Land), to say nothing of private contributions through NGOs, but municipal officials may still regard their mission as "get it as cheap as possible". Professor Doremus wrote in 2001, "The link between three highly controversial issues in today's American West, water, urban population growth, and the protection of endangered species, has become impossible to ignore." (2001: 361). This was probably the only error in that article. Policy will change, perceptions will change, and prices will change, but when? If we are committed to markets instead of planning, why not well-informed working markets? Why not now?

References, recommended and other materials:

- Adams, B., Ed., 1999, Potential Consequences of Climate Variability and Change to Water Resources of the United States. Herndon, VA: American Water Resources Association.
- Arendt, R. et al., Rural by Design: Maintaining Small Town Character, 1994, Chicago: American Planning Association.
- Arnell, N. and C. Liu, et al., 2001, Hydrology and Water Resources. Chapter 4 in IPCC 2001, Climate Change 2001: Impacts, Adaptation and Vulnerability, Working Group II, Intergovernmental Panel on Climate Change, Cambridge: Cambridge University Press.
- Barnett, T., R. Malone, W. Pennell, D. Stammer, B. Semtner and W. Washington, 2004, The effects of climate change on water resources in the West: introduction and overview. [Introduction to special issue.] Climatic Change 62 (1): 1-11.
- Bordsen, M., 2003, Citizen Participation Done Right. Journal of the American Planning Association 69(3): 313.
- Bradshaw, B., D. Dolan and B. Smit, 2004, Farm-level adaptation to climatic variability and change: crop diversification in the Canadian Prairies. Climatic Change 67: 119-141.
- Brody, S.D., D.R. Godschalk, and R.J. Burby, 2003, Mandating Citizen Participation in Planning – Six Strategic Choices. Journal of the American Planning Association 69(3): 245-264.

- Bureau of Reclamation, Department of the Interior, 2006, Platte River Recovery Implementation Program; Final Environmental Impact Statement. Denver, CO: Bureau of Reclamation.
- Burby, R.J., 2003, Making Plans that Matter – Citizen Involvement and Government Action. *Journal of the American Planning Association* 69(1): 33-49.
- Cagan, A., S. Sharpe and J. Hertzberg, 1986, Citizen Participation (Ch 12), in So, F.S., I. Hand, and B.D. McDowell, Eds., 1986, *The Practice of State and Regional Planning*. Chicago: American Planning Association, International City Management Association.
- Cai, X., 2005, risk in irrigation water supply and the effects on food production. *Journal of the American Water Resources Association* 41(3): 679-692.
- California Department of Water Resources, 2005, California Water Plan – A Framework for Action. Department of Water Resources Bulletin 160-05. Sacramento: Author. Available at: <[www.waterplan.water.ca.gov/](http://www.waterplan.water.ca.gov/)>
- Daniels, T.L., J.W. Keller, and M.B. Lapping, 1995, *The Small Town Planning Handbook*, 2d Ed., Chicago: American Planning Association, Chaps. 10, 12 and 21
- Dobrowolski, J.P., M.P. O'Neill, and L.F. Duriancik, Eds., 2005, United States Department of Agriculture, Research, Education and Economics, [Agricultural Water Security Listening Session, Final Report \[of meeting September 9-10, Park City, UT\]](http://www.csrees.usda.gov/nea/nre/pdfs/ree_water_security.pdf), Washington, D.C., and <[http://www.csrees.usda.gov/nea/nre/pdfs/ree\\_water\\_security.pdf](http://www.csrees.usda.gov/nea/nre/pdfs/ree_water_security.pdf)>
- Doremus, H., 2001, Water Population Growth, and Endangered Species in the West. *University of Colorado Law Review* 72: 361-414.
- Edmonds, J.A. and N.J. Rosenberg, 2005, Climate change impacts for the conterminous USA: An integrated assessment summary [summary of special issue]. *Climatic Change* 69(1): 151-162.
- Forester, J., 2006, Making Participation Work When Interests Conflict. *Journal of the American Planning Association* 72(4): 447-456.
- Getches, D.H., 1999, *Water Law in a Nutshell*, 3rd Ed., St. Paul, Minn.: West Publishing Co.
- Gleick, P.H., lead author, 2000, *Water: The Potential Consequences of Climate Variability and Climate Change for the Water Resources of the United States; Report of the Water Sector Assessment Team*. For U.S. Global Change Research Program. <http://www.usgcrp.gov/usgcrp/nacc/water/default.htm>
- Godschalk, D.R., 2004, Land Use Planning Challenges. *Journal of the American Planning Association* 70(1): 5-13.
- Hamin, E.M., 2003, Legislating Growth Management – Power, Politics and Planning. *Journal of the American Planning Association* 69(4): 369-380.
- Hanak, E. and M.K. Browne, 2006, Linking Housing Growth to Water Supply. *Journal of the American Planning Association* 72(2): 154-166.
- Hartman, T., "GOP panel agrees: Warning of global warming overdone; Group discusses Al Gore's film; few have seen it." *Rocky Mountain News*, 28 APR 07 p. 19.
- Herrmann, R., Ed., 1992, *Managing Water Resources During Global Change: An International Conference*. Herndon, VA: American Water Resources Association.
- Hoch, C.J., L.C. Dalton and F.S. So, 2000, *The Practice of Local Government Planning*, 3rd Ed. Washington, D.C.: International City/County Management Association.
- Howarth, R.B., 2003, Catastrophic outcomes in the economics of climate change. *Climatic Change* 56: 257-263.

- Howe, C.W. and C. Goemans, 2003, Water Transfers and their Impacts: Lessons from Three Colorado Water Markets. *Journal of the American Water Resources Association* 39(5): 1055-1065
- Howe, C.W. and J.D. Wiener, 2004, Attachments to Report on Exploratory Assessment of Potential for Improved Water Resources Management in Three Western States and Selected Tribes, under NOAA Office of Global Programs, Funded Research, Human Dimensions of Global Change, Howe et al., 1999 initial funding, "Exploratory Assessment of potential for improved water resources management..." and attachments file: [http://www.ogp.noaa.gov/mpe/csi/econhd/1999/howe\\_2004\\_attach.pdf](http://www.ogp.noaa.gov/mpe/csi/econhd/1999/howe_2004_attach.pdf)
- Howe, C.W., 1998, Water Markets in Colorado: Past Performance and Needed Changes. Pp 65-76 in Easter, W.K., M.W. Rosegrant and A. Dinar, Eds., *Markets for Water: Potential and Performance*. Boston: Kluwer Academic Publishers.
- Howe, C.W., 2000, Protecting Public Values in a Water Market Setting: Improving Water markets to Increase Economic Efficiency and Equity. *University of Denver Water Law Review* 3(2): 357-372.
- Jacobs, J.M., 2003, The Politics of Property Rights and the National Level. *Journal of the American Planning Association* 69(2): 181-189.
- Johnson, C., T.J. Dowd, and C.L. Ridgeway, 2006, Legitimacy as a Social Process. *Annual Review of Sociology* 2006, 32: 53-78.
- Kaplan, R., M.E. Austin, and S. Kaplan, 2004, Open Space Communities – Resident Perceptions, Nature Benefits, and Problems with Terminology. *Journal of the American Planning Association* 70(3): 300-312.
- Kim, J., 2005, A projection of the effects of the climate change induced by increased CO2 on extreme hydrologic events in the Western U.S. *Climatic Change* 68: 153-168.
- Klein, W.R., 2000, Building Consensus. Chap. 17 in Hoch, C.J., L.C. Dalton and F.S. So, 2000, *The Practice of Local Government Planning*, 3rd Ed. Washington, D.C.: International City/County Management Association.
- Laurian, L., 2004, Public Participation in Environmental Decision-making – Findings from Communities Facing Toxic Waste Cleanup. *Journal of the American Planning Association* 70(1): 53-65.
- Negri, D.H., N.R. Gollehon, and M.P. Aillery, 2005, The effects of climatic variability on US irrigation adoption. *Climatic Change* 69: 299-323.
- Ojima, D.S. and J.M. Lockett, et al., 2002, Preparing for a Changing Climate: The Potential Consequences of Climate Variability and Change – Report of the Central Great Plains Regional Assessment Group, For U.S. Global Change Research Program. Fort Collins, CO: Colorado State University; <[http://www.nrel.colostate.edu/projects/gpa/gpa\\_report.pdf](http://www.nrel.colostate.edu/projects/gpa/gpa_report.pdf)>.
- Olinger, D. and C. Plunkett et al., 2005, "Liquid Assets – Turning Water into Gold", multi-part series with sidebars, 21, 22, and 23 November 2005, [The Denver Post](#).
- Pielke, R.A., Sr., N. Doesken, O. Bliss, T. Green, C. Chaffin, J.D. Salas, C.A. Woodhouse, J.J. Lukas and K. Wolter, 2005, Drought 2002 in Colorado: An Unprecedented Drought or a Routine Drought? *Pure and Applied Geophysics* 162 (2005): 1455-1479
- Rayner, S., D. Lach and H. Ingram, 2005, Weather forecasts are for wimps: why water resource managers do not use climate forecasts. *Climatic Change* 69: 197-227.

- Reilly, J., et al., 2001, Agriculture: the Potential Consequences of Climate Variability and Change for the United States. For U.S. Global Change Research Program. <<http://www.usgcrp.gov/usgcrp/nacc/agriculture/default.htm>>
- Reilly, J., et al., 2003, U.S. Agriculture and Climate Change: New Results. *Climatic Change* 57: 43-69.
- Rhodes, S.L., K.A. Miller and L.J. MacDonnell, 1992, Institutional Response to Climate Change: Water Provider Organizations in the Denver Metropolitan Region. *Water Resources Research* 28(1): 11-18.
- Rosenberg, N.J. and J.A. Edmonds, 2005, Climate change impacts for the conterminous USA: An integrated assessment: From MINK to the 'Lower 48' [introduction of special issue]. *Climatic Change* 69: 1-6.
- Sabatier, P.A., W. Focht, M. Lubell, Z. Trachtenberg, A. Vedlitz, and M. Matlock, Eds., 2005, *Swimming Upstream: Collaborative Approaches to Watershed Management*. Cambridge, MA: MIT Press.
- So, F.S., I. Hand, and B.D. McDowell, Eds., 1986, *The Practice of State and Regional Planning*. Chicago: American Planning Association, International City Management Association.
- Stevens, W.K., 1991, "In a Warming World, Who Comes out Ahead?" *New York Times*, 05 Feb 1991 (accessed April 2007). The Times made this available for contrast (little) with Revkin, A.C., "Poor Nations to Bear Brunt as World Warms", 01 April 2007.
- Varis, O., T. Kajander, and R. Lemmela, 2004, Climate and water: From climate models to water resources management and vice versa. *Climatic Change* 66: 321-344.
- Wagner, F.H., ed., 2003, *Rocky Mountain – Great Basin Regional Climate Change Assessment*. For the U.S. Global Change Research Program. Logan, Utah: Utah State University, and <<http://www.cnr.usu.edu/default.asp?category=publications&section=publications&content=climate>>
- Western Water Policy Review Advisory Commission, 1998, *Water in the West*. Available from National Technical Information Service, Port Royal, Virginia.
- Wiener, J.D., 2005, Learning From and About Co-Operative Extension Services, Session Report and annotated references, from Panel Discussion at Climate Prediction Applications Science Workshop II, Tallahassee, FL, March 2004. Posted as Appendix to Wiener, 2005 presentation at Climate Prediction Applications Science Workshop III, Palisade, NY, International Research Institute for Climate Prediction, at <http://iri.columbia.edu/outreach/meeting/CPASW2005/Presentation/JWiener.pdf>
- Willson, R.W., M. Payne, and E. Smith, 2003, Does Discussion Enhance Rationality? *Journal of the American Planning Association* 69(4): 354-367.

Acknowledgements: Partial funding from NOAA, and stimulating discussions with Dr. Charles Howe, and Dr. Edna Loehman contributed to this argument, as well as Joanne Dunnebecke.

Author contact information: John D. Wiener, Research Associate, Program on Environment and Society, Institute of Behavioral Science, University of Colorado, Boulder, CO 80309-0468 Phone 303-492-6746; <[John.Wiener@Colorado.Edu](mailto:John.Wiener@Colorado.Edu)>