



Economics 148: Natural Resource Economics

By Dr. Mason Gaffney

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Topics and Readings, Ecs. 148, 01-S.

See list of Acronyms to identify those used below.

See Reserve List for books available at RBR.

See "Reader for Ecs. 148" for items not on Reserve. Reader is available at Printing and Reprographics

See schedule for timing.

I. Geography

- A. Major sources and uses of Calif. Water
 - Water use by crop; CWA 82-83
 - Acres in various crops, by region, CWA 102
 - Interregional transfers, CWA 109
- B. California plumbing, macro and micro
 - City supply systems, CWA 28-37; WS Chap.11
 - The great valley, CWA 46-57; BCM Fig. 5, p. 38; Fig. 7, p.40; Fig. 11, pp.48-49; Table 3, p.51; Fig. 12, p.57
 - Statewide conspectus, CWA 70-71
- C. Rent and value of water and adjunct resources: location, elevation, quality!
 - RW?; TS;
- D. Aquifers, their protection and management
- E. Watersheds, their protection and management
- F. Fisheries, their protection and management

II. Landownership: concentration, dispersion, and reconcentration.

- A. Prior landownership as basis for staking claims to water: land overlying aquifers, riparian land, land to support "beneficial use" in appropriative claims, "domestic use" priority for cities, land to enhance financial and political power of both private and semipublic agencies, land for rights-of-way (ROWS)
 - WW?O 45-47;
- B. Inflated water claims (rent-seeking) as basis of land speculation in urban sprawl;
 - RUCW
- C. History of concentration, subdivision, and reconcentration
 - 1. 19th Century land monopoly, and economic stagnation
 - OLLP; Gates-1961, 1962, 1970, 1975, 1978; FF, 11-27; CALSTRESS; Worster 98-11; Sheehan 1985; Huffman, 19-20;
 - 2. Subdivision, intensification and development, 1900-1940
 - Henley; Mason; Goldschmidt 1946; RUCW; EA; CALSTRESS; Troy; Rhodes (notes); Huffman, 24-27
 - 3. Reconcentration, 1940-date
 - Modules from WHOOWNSC; Water Monopoly; Gottlieb/Wolt, 500-09; Gottlieb 1988, 1991; Worster 242-47, 291-

302; Goodall 1991; Fellmeth, Ch. 1; M&W; Roberts; Villarejo 1981; FF; Taylor 1949, pp. 239-53;

The "landmark" Ivanhoe decision, and its unexpected consequences

WPWM 495, and notes 62-64; WW?O, 44-45;

4. Farms and cities

Rhodes; Goldschmidt, 1946; RUCW;

D. Who owns Aquifers, Watersheds, Storage Sites, Power Drops, and Fisheries? Who protects, manages and conserves them?

E. Land speculation

Huffman pp.57-65; 82-83

III. Productivity and value of water

A. Data showing "average productivity"; data on marginal productivity. (By uses, regions, seasons, etc.)

B. Indications of waste through misallocation

Kaweah

C. The anomaly of water (and energy) as "yield-cutting substitutes" - is it productive to cut yields, while cutting costs more? Neglect by "production economics" theorists. Effect on AP of water.

QUANTUM; WPWM, 476-78; Sub; WW?O 4-6;

D. Power drops. Are they "non-consumptive"? The cost of adding entropy.

WW?O 30-31;

E. Rent and value of water: location, elevation, & quality.

WPWM 490-91; TS; WW?O, 29-30;

F. Negative productivity: runoff, drainage problems, salinity, pollution (point-source, and non-point), damage to natural instream uses, subsidence of aquifers, preempting storage capacity (from flood-control, power generation, recreation, etc.), loss of elevation, loss of quality, etc.

Economics and environmentalism: tradeoff, or symbiosis?

WPWM 484-86; NPP; WW?O 9-17;

IV. Institutions controlling water "ownership" (licensure), allocation, storage, distribution, conservation and land use

A. Water law

WL&ETR; Huffman, pp.37-39, 40-45, 45-49, 50-52;

Kaweah; 1977 Testimony; EA, selections; MAWR; WW?O 1-4, 45-47;

B. Irrigation Districts (Wright Act, 1887; Denman amendments, 1909); Inclusion of cities;

EA; Henley; J.R. Mason; Huffman, 73-77; Troy;

C. Mutual Water Companies

Huffman, 71-72; SCIL, 154-56

D. Cities and Metro Districts

RUCW; WW?O, pp. 47-50; WPWM, pp.500-02.

E. Quasi-public water districts (legal powers and privileges of public bodies, but voting and leadership by ownership only)

Goodall 1978, 1991; module; CWA 63-64; WPWM 500-02; B&M; WW?O 47-50;

F. State Agencies - dreams of statewide rationalization, The Marshall Plan, ff. by bankruptcy, ff. by conversion of CDWR to foil USBR, acreage limitation, and flexible water allocation
Sheehan 1983

G. Fed Agencies

1. Bureaucrats as marketeers - USBR's program of flexibility and rationalization, and who curbed it.

WPWM, 479-80;

2. Annihilating BAE, sterilizing USBR, and magnifying USACE and CDWR: forces that shape bureaucrats.

WPHN; CFWP; WPWM 495-99; Worster 245-49; Taylor 1976; WW?O 36-45; Goldschmidt 1978, pp.455-91; Goldschmidt 1991; Worster 290-303

3. Congenital faults of Federal policy

CFWP; WPHN

H. Franchised power companies, and their licensure by FPC, FERC, et al.

I. Interstate and international issues

Huffman pp.53-56;

J. Tradition of subsidy: farm preferences; exploitation of the aquifer depletion treadmill

ADT; WW?O, pp.6-9;

K. Case study: the Kaweah River service area

Kaweah; BCM, Fig. 22, p.432; pp.458-60

L. Water law again: what is "property," and whose water is it?

WW?O pp.1-4;

M. The test of taxability: is water taxable property?

WPWM 488-90

N. Environmental law; symbiosis of economists and environmentalists (Who else "speaks for mankind"?). See III, F, above.

V. Water Marketing

A. The great potential benefits from better allocation. About-face of economists from passive complacency to dogmatic zealotry, synchronized with shift of major "stakeholders" from obstructing marketing to promoting it.

WPWM 475-76; WW?O 18-27;

B. Slow progress of move to marketing

WPWM, 478-80

C. Flaws in consumer sovereignty:

1. How prior distribution dominates allocation.
Errors in The Coase Theorem.
WPWM 491-93;
2. Legitimate demands that are not expressed via markets
Hawken; WPWM;
3. Costs that are not expressed via markets
NPP; external economies (Huffman, 124-34),
Goldschmidt;
4. Extinction of common rights in the process of privatization
WPWM 486-90; WW?O 32-36;
5. Self-generated demand from premature service to subeconomic lands
6. Undermotivated sellers
WPWM 480-81;
6. Leaks in the market system - are they pluggable?
Uncontrolled Pumping, WPWM 481-84; WW?O 6-10;
7. Racing for water-rents
WPWM 493-95;
- D. Private owners as champions of free markets: a temporary alliance of convenience? History of bureaucrats promoting water marketing, and landowners blocking it.
WW?O, 36-45; WPWM, 495-99;
- E. Analogous history: the forgotten reign of English doctrine of "free trade in land," recycled today as "the new resource economics."
Reading from A.R. Wallace

VI. Optimal pricing of water

- A. Principles of marginal-cost pricing; fallacies of average-cost pricing.
J&L 544-45;
- B. Increasing Costs in supply, storage and wheeling, coupled with Decreasing Costs in distribution
Milliman;
- C. Rent and value of water at the source
TS; WW?O, pp.29-30
- D. Variable peak-pricing as substitute for excess capacity
- E. Zonal pricing to combat urban sprawl
- F. Tradeoffs in reservoir management
- G. Pump tax as a "Green Tax" surrogate for unitized management of aquifers. Who shall pay for recharging, and how, when waters commingle in aquifers?
WW?O 50-51; WPWM, pp. 481-82, 488
- H. Pricing and ownership: who has the right to collect for selling water?

- I. Periodic payment vs. one-time sale of perpetual claims
- J. Tokenism and its futility

WW?O 17-18;

VII. Designing and sizing water supply works, with rising demand

A. Biases toward oversizing: empire- and monument-building; cheap money; logrolling, state and federal; political power of materials suppliers, major contracting firms, law firms, financing firms, etc.

WS 289-350; PeriCanal; Huffman, 82-83

B. Biases toward undersizing: inadequate financing, pigmy dams built for claimstaking (rent-seeking), excess diversion capacity (claimstaking) coupled with inadequate delivery capacity (use and service).

Kaweah, pp. xx-yy;

- C. Striking an optimal balance: When to build What?

Readings for Ecs. 148, Spring 01, available from Printing and Reprographics

Table of Contents, alphabetical by acronyms and authors

"mod" means module, i.e. an excerpt.

Ballard = "And Conflict Shall Prevail," notes by M.G.
Bass = News items on the Bass Bros.
CALSTRESS = "Ec. Dev. in Cal. as Response to Stress," draft
Castaic Lake = Notes from news sources
CFWP = Gaffney, "A Critique of Federal Water Policy"
CFWP & Jordan = Q&A on above, with Sen. from Idaho
EA = Gaffney, "Economic Aspects of Water Resource Policy"
FF = McWilliams, Factories in the Field, Chap. 2
Goldschmidt 1991 = "What If?"
Goodall 1991 = "Property & Wtr Instns in Cal"
Goodall 1978 = Calif. Water, notes by M.G.
Gottlieb/Wolt = Thinking Big, pp.500-09, "The Ag-bus Interests"
Graham = Some Aspects of Fed-State Relations, notes by M.G.
Mason = "The Cal Irrigation Districts Case"
MAWR = Gaffney, Means of Allocating Water Resources (U of GA)
Measures = Measures of water, and conversion factors
Milliman = Gaffney, Milliman on Urban Water Price and Tax Policy
Misc. = Water Economics, Miscellaneous notes by M.G.
NPP = Gaffney, Non-point Pollution: Tractable Solutions
PeriCanal = Gaffney, "Why I recommend a "no" vote on S.B. 200"
QUANTUM = Quantum leaps and ecotones, notes by M.G.
Rhodes = "The Thirsty Land," notes by M.G.
RUCW = "Rural-urban Competition for Water"¹
Steinbeck = Grapes of Wrath, Chap. 19
SUB = Substitution of water for labor and capital, notes by M.G.
Trott = "Doing it the Wright Way."
TS = Gaffney, "The Taxable Surplus in Water Resources"
WATER MONOPOLY = Excerpt from M.G. on Rising Farm Concentration
WHOOWNSC = "Who Owns Southern California?", module
WL&ETW = Water Law and Economic Transfers of Water (Trelease)
WPHN = "Water, Politics and Human Nature," from Challenge Mag²
WPWM = Gaffney, 1997, "What Price Water Marketing"
WW?O = Gaffney, 1991, "Whose Water? Ours"

¹ JFE 42(5):1363-66, Dec. 1960. Still being sought for.

² Challenge 8(9):24-28, June 1960 - still being sought for

Books on Reserve, Econ. 148, S-01

Becker = Land and Building Taxation

Carstensen = The Public Lands

CWA = Kahrl, Wm., Calif. Water Atlas

Fellmeth = Fellmeth, Robert, Politics of Land

FF = McWilliams, Carey, Factories in the Field, Chap. 2

Gates 1936 = "The Homestead Act ... " In Carstensen, 1962

Gates, et al. = Four Persistent Issues, article by Gates

Geisler & Popper = Land Reform, American Style

Goldschmidt, 1946 = As you Sow

Goldschmidt, 1978 = As you Sow, Three Studies in ... Agribusiness

Goodall 1978 = Cal Wtr: a New Political Economy

Gottlieb/Wolt = Thinking Big

Henley = "Land Value Taxation by Cal. Irrig. Districts" in Becker

Huffman = Irrig Dev & Pub Wtr Policy

Kaweah = "Diseconomics inherent in Cal. Water Law"

MacCannell, 1988 = Ind. Ag. & ... Degradation, in Swanson, q.v.

M&W = MacCannell & White, 1984, in Geisler & Popper, q.v.

OLLP = George, Henry, Our Land and Land Policy

Roberts = The Fellmeth Report, Power and Land in California

Sheehan-1983 = The Soc. Sci J. 20(2), Apr 83:29-40

Sheehan-1985 = Ditto 22(1), Jan 1985:xx-yy

SCIL = McWilliams, S. Cal, Island on the Land, pp.154-56

Steinbeck = Steinbeck, John, Grapes of Wrath, Chap. 19

Swanson = Agric. & Community Change in the U.S., 1988

Taylor-1949 = The CVP, pp. 239-53. In Taylor-1979

Taylor-1976 = W. Goldschmidt's baptism by fire, in Taylor-1979

Taylor-1979 = Paul Taylor, collected writings

Villarejo, 1981 = New Lands for Agric.

Worster = Rivers of Empire.

WS = Hirshleifer et al., Water Supply

Ecs. 148, Natural Resource Economics, Fall 01, Schedule

Prerequisite: Economics 102A, Micro-economic Theory

Class meets 9AM, MWF, Sproul 2366

Bases for grading:

Performance in class. I appreciate all questions, including but not limited to sharp and challenging questions. Do not be afraid to ask dumb questions: if you don't get it, chances are that many other students don't either. The dumbest question is the one you were afraid to ask.

Quizzes – about one a week, 5 minutes @. These are important because first impressions are important, and they give you practise for major exams.

Midterm

Final

Extra work (e.g. papers submitted).

Final counts twice as much as midterm. These two exams, together, constitute your "Base Grade." Extra credit work and superior classroom performance (including quizzes) go on top of the base grade.

Weighting of classroom performance and extra work varies with quality. Do not ask, "How many points do I get for this?" Why not?

- 1, It varies from zero on up, depending on how good it is;
- 2, Asking that question makes a bad impression, indicating that you are less interested in the subject for its own sake, as befits a college student, and more interested in collecting "gold stars," as would befit an elementary school student. Extra credits **could** add from 1/2 a letter grade to a full letter grade to your "base" grade. There are no guarantees, however. The Instructor is the judge of quality. Any kind of plagiarism (which I hope never to see) would result in severe penalties.

More than 2-3 absences count as **negative** extra credit. (If you are sick, or in trouble, and have a documented reason, let me see the documents. Family outings and reunions and your cousin's wedding are not good reasons.) Drifting in late, or out early, makes a bad impression that may affect your grade – just as it would affect your prospects on a job. I am tolerant, but don't push it.

For extra work, clip a current newspaper article and explain its relevance to ideas discussed in the course and the readings. Your comments may be less than a page, or more if you have more to say. Hardly a week will pass without there being an article published dealing with resource economics generally, and water economics in particular. I will return up to five such papers per student, with comments which will be intended to help you do better on the next paper. One superior paper is worth more than five weak papers, so give each one care and thought. Credit will depend on quality and, of course, originality. A higher quantity is good in that it gives you more practise, but will help you only if you improve as you go. **If quality is low, more quantity**

will not improve your grade. Deadline for submitting papers is the last day of teaching, but last-minute papers may be discounted. Earlier submission is better – much better.

Location of reading assignments.

P&R = a book of readings available in Printing and Reprographics

RBR = Reserve Book Room, in Rivera Library, right side of front desk

Special case: The California Water Atlas (CWA). UCR has four (4) copies you may use. One is in the Science Library, reference section. Two are at the **Reference** (not Reserve) Desk, Rivera Library. A fourth one is in the Government Documents Section, Rivera Library.

Week I: Geography of California water

A, Major sources and uses of California water

Water use by crop. California Water Atlas (CWA) 82-83

Acres in various crops, by region. CWA 102

Interregional transfers. CWA 109

B, California plumbing, macro and micro

City supply systems. CWA 28-37

Southern California system. RBR, Hirshleifer et al., Water Supply, Ch.11. (This is long; you may want to skim it for its geographical elements.)

The Great Central Valley. CWA 46-57

5 maps from Bain et al., to be distributed in class.

Statewide conspectus. CWA 70-71

C, Rent and value of water and adjunct resources (damsites, aquifers, canal routes, etc.). Location, elevation, and quality.

P&R, "Taxable Surplus in Water Resources"

D, Aquifers: location, scarcity value, protection, management

CWA 68-69. Get the big picture, and try to locate the Cadiz Co. aquifer in the Mojave – it is in the news currently.

E, Watersheds: location, scarcity value, protection, management

CWA 11, shows where the snowpacks are.

F, Fisheries: location, protection, management

Week II: Landownership: concentration, dispersion, and reconcentration.

A. Prior landownership as basis for staking claims to water: land overlying aquifers, riparian land, land to support "beneficial use" in appropriative claims, "domestic use" priority for cities, land to enhance financial and political power of both private and semipublic agencies, land for rights-of-way (ROWs), etc.

P&R, "Whose Water? Ours," 45-47

- B. Inflated water claims (rent-seeking) as basis of land speculation in urban sprawl;
P&R, "Rural-Urban Competition for Water," esp. pp.4-5
- C. California history of land concentration, then subdivision, and finally reconcentration
1. 19th Century land monopoly, and economic stagnation. There are a lot of readings in this section. Don't let that scare you. Skim them, and focus on two or three that interest you the most. You'll never understand California until you learn this background. Did our ancestors ever start the race of life even? Not so far as any historian has observed.
RBR, George, Our Land and Land Policy, Chapter on California
RBR, Gates, "The Homestead Act ...", a chapter in Carstensen, 1962,
The Public Lands
RBR, Gates, "Public Land Disposal in California," a chapter in Shideler, 1975, Agriculture in the Development of the Far West
RBR, Gates, "The Henry George Era in California," a chapter in Lee, 1978, Four Persistent Issues
P&R, McWilliams, Factories in the Field, 11-27,
P&R, "Economic Development in California as a Response to Stress"
(CALSTRESS)
RBR, Worster, Rivers of Empire, 98-111;
Sheehan, 2 articles on the Miller and Lux Co. landholdings, in The Social Science Journal for April, 1983, pp.29-40, and January, 1985. These are in the general stacks – RBR will not circulate journals. Consider these optional. Sheehan was a grad student here.
RBR, Huffman, Irrigation Development and Public Water Policy, 19-20;
 2. The era of subdivision, intensification, rural and urban development, 1900-1940
RBR, Henley, "Land Value Taxation by California Irrigation Districts," in Becker, Land and Building Taxation.
P&R, J. Rupert Mason, article on irrigation districts
RBR, Goldschmidt, 1946, As You Sow. (Skim, noting good sociological health of Dinuba, CA.)
P&R, Rural-urban Competition for Water
P&R, "Economic Aspects of Water Resource Policy," section 1, on irrigation districts.
P&R, CALSTRESS (repeat)
P&R, Troy, "California's Irrigation Districts," notes by M.G.
P&R, Rhodes, "The Thirsty Land," notes by M.G.
RBR, Huffman, Irrigation Development and Public Water Policy, 24-27
 3. The Era of Reconcentration, 1940-date
P&R, "Who Owns Southern California?" (WHOOWNSC)

- RBR, Gottlieb/Wolt, 1977, 500-09 (on water monopoly)
- RBR, Gottlieb 1988, A Life of its Own, (skim)
- RBR, Gottlieb, 1991; A Thirst for Growth (skim)
- RBR, Worster, Rivers of Empire 242-47, 291-302
- P&R, Goodall 1991, "Property and Water Institutions in California"
- RBR, Fellmeth, The Politics of Land, Ch. 1 only
- RBR, Roberts, Power and Land in California (an excerpt of the best economics from Fellmeth's somewhat flawed book)
- RBR, Villarejo 1981, New Lands for Agriculture
- RBR, Taylor 1949, "The Central Valley Project," in Taylor, 1979, Land and Law in California, pp. 228-37, 247-49, and 251

4. Paul Taylor's Pyrrhic Victory: the landmark Ivanhoe decision, and the kickback. *CWP*

- P&R, "What Price Water Marketing" 495, and notes 62-64;
- P&R, "Whose Water? Ours," 44-45;

4. Farms and cities

- P&R, Rhodes (Repeat);
- P&R, Goldschmidt, 1946, (Repeat);
- P&R, Rural-Urban Competition for Water (Repeat) *Note different emphasis*

D. Who owns Aquifers, Watersheds, Storage Sites, Power Drops, and Fisheries?
Who protects, manages and conserves them?

No reading assignment, but I refer to this in class from time to time, so keep alert to it as a topic (and possible exam question)

E. Land speculation

- RBR, Huffman pp.57-65; 82-83
- Bear in mind that all the material on landownership, and racing for water claims, is about "land speculation" in a wider sense than Huffman's narrow usage. *key analysis*

III. Productivity and value of water

A. Data showing "average productivity"; data on marginal productivity. (By uses, regions, seasons, etc.)

B. Indications of waste through misallocation

✓ RBR, "Diseconomies Inherent in Western Water Laws: a California Case Study" ("The Kaweah Study," for short). Section "A", pp. 1-16, evidences of differing marginal productivities of water within the system.

C. The anomaly of water (and energy) as "yield-cutting substitutes" - is it productive to cut yields, while cutting costs more? Neglect of this matter by "production economics" theorists. Effect of yield-cutting on the AP of water.

P&R, Quantum Leaps and Ecotones, pp. 1-5.
P&R, What Price Water Marketing, pp. 476-78;
P&R, Substitution, pp. 1-4;
P&R, Whose Water? Ours, pp. 4-6;

D. Power drops. Are they "non-consumptive"? The meaning and importance of "entropy," and how power drops subtract value by adding entropy.

P&R, Whose Water? Ours, pp. 30-31;

E. Rent and value of water: location, elevation, & quality.

P&R, What Price Water Marketing?, pp. 490-91;
P&R, Taxable Surplus in Water Resources;
P&R, Whose Water? Ours, pp. 29-30;

F. Negative productivity: runoff, drainage problems, salinity, pollution (point-source, and non-point), damage to natural instream uses, subsidence of aquifers, preempting storage capacity (from flood-control, power generation, recreation, etc.), loss of elevation, loss of quality, etc.

Economics and environmentalism: tradeoff, or symbiosis?

P&R, What Price Water Marketing?, pp. 484-86;
RBR, Non-Point Pollution: Tractable Solutions to Intractable Problems;
P&R, Whose Water? Ours, pp. 9-17;

IV. Institutions controlling water "ownership" (licensure), allocation, storage, distribution, conservation and land use

A. Water law

RBR, Huffman, pp.37-39, 40-45, 45-49, 50-52;
RBR, "Diseconomies Inherent in Western Water Laws: a California Case Study" ("The Kaweah Study," for short), pp. 30-43, role of water law in blocking economical transfers.
P&R, Economic Aspects, pp. 136-41;
P&R, "Comparison of Market Pricing and Other Means of Allocating Water Resources," (alphabetized as "MAWR," in Vol. I); Read the entire article. Be sure your copy has all the pages in it – if some are missing, P&R has agreed to furnish you with replacement copies. This is a key reading!

P&R, Whose Water? Ours, pp. 1-4, 45-47;

B. Irrigation Districts (Wright Act, 1887; Denman amendments, 1909); Inclusion of cities;

P&R, Economic Aspects, to p.135 (repeat);
RBR, Albert Henley, "Land Value Taxation by California Irrigation Districts," in Becker, Land and Building Taxation;
P&R, J.R. Mason, article on irrigation districts (repeat);

RBR, Huffman, pp. 73-77, repeat;

P&R, Troy, notes by M.G., repeat

C. Mutual Water Companies

RBR, Huffman, 71-72;

D. Cities and Metro Districts

P&R, Rural-Urban Competition for Water, repeat;

P&R, WHOSE WATER? OURS, pp. 47-50;

P&R, WHAT PRICE WATER MARKETING?, pp. 500-02.

E. Quasi-public water districts (legal powers and privileges of public bodies, but voting and leadership by ownership only)

P&R, Goodall 1978, notes by M.G., one page;

P&R, Goodall, 1991, pp. 1-15 + notes. (This unpublished MS, Goodall's last work, is direct and to the point, refreshingly free of the "safety-belt writing" that makes most texts and journal articles so dull and inconclusive.).

LIBRARY, California Water Atlas, pp. 63-64, text on "Water Districts in Calif.";

P&R, WHAT PRICE WATER MARKETING?, pp. 500-02;

P&R, WHOSE WATER? OURS, pp. 47-50

(For more on the MWDSC, Bradley and Morales edited a detailed report that you can order from the UCLA Library by Interlibrary Loan.)

F. State Agencies – early engineering dreams of statewide rationalization, The Marshall Plan of the 1920s. This was aborted by State bankruptcy in the 1930s. A part of the ambitious integrated plan was hived off to the U.S. Bureau of Reclamation, to get federal financing, and is now known as the Central Valley Project. In 1960 the voters passed (just barely) a huge state bond issue to begin the California Water Plan, (aka the Feather River Project, aka the California Aqueduct, aka the Burns-Porter Act). The California Department of Water Resources (DWR) is in charge, quickly growing into a mighty state agency and bureaucracy. Its major beneficiaries are vast holdings on the west side of the Tulare Lake Basin region and also south of the Tehachapis, whose owners wanted to avoid two federal policies: acreage limitation, and flexible water allocations.

Available from instructor for interested students: Sheehan, 1983

G. Federal Agencies

1. Bureaucrats as marketeers – the U.S. Bureau of Reclamation's program of flexibility and rationalization, and who curbed it.

P&R, WHAT PRICE WATER MARKETING?, pp. 479-80;

2. Annihilating the Bureau of Agricultural Economics (BAE), sterilizing the U.S. Bureau of Reclamation, and magnifying the U.S. Army Corps of Engineers and California DWR: private political forces that shape bureaucrats, who then get the blame.

P&R, WHAT PRICE WATER MARKETING?, pp. 495-99;

RBR, Worster, pp. 245-49;

RBR, "Walter Goldschmidt's Baptism by Fire," in Taylor, Land and Law

in California:

P&R, WHOSE WATER? OURS, pp. 36-45;
RBR, Goldschmidt, As you Sow, pp.455-91;
P&R, (just following Factories in the Field), Goldschmidt 1991;
RBR, Worster 290-303

3. Congenital faults of Federal policy

P&R, Gaffney, "A Critique of Federal Water Policy" (CFWP)
Optional, by request. Gaffney, "Water, Politics, and Human Nature,"

from Challenge Magazine

H. Franchised power companies, and their licensure by FPC, FERC, et al.

(Like many other licensees, these have managed to turn their 40-year licenses into de facto perpetual ownerships, on "sweetheart" terms.) No reading assigned, but for some of their major power drops, see the Calif. Water Atlas.

I. Interstate and international issues

RBR, Huffman pp.53-56. (For more readings on this potentially explosive issue, ask the instructor. Students of international economics should know about the Jordan, Tigris and Euphrates, Nile, Rhine, Danube, Columbia, Colorado, Rio Grande, and other hot spots.)

J. Tradition of subsidy to water wastage: farm preferences; exploitation of the aquifer depletion treadmill

P&R, WHOSE WATER? OURS, pp.6-9;

P&R, WHAT PRICE WATER MARKETING?, pp.484-85

K. Case study: the Kaweah River service area

RBR, Kaweah study. Review parts previously assigned, and now study the rest of it: Part II, on wastes in the system; and Part IV, on Dynamics of the System;

HANDOUTS: Bain, Caves, and Margolis, The Northern California Water Industry, , Fig. 22, p.432; pp.458-60

L. Water law again: what is "property," and whose water is it?

P&R, WHOSE WATER? OURS, pp.1-4;

M. The test of taxability: is water taxable property?

P&R, WHAT PRICE WATER MARKETING?, pp. 488-90

N. Environmental law; symbiosis of economists and environmentalists (Who else "speaks for mankind"?). See III, F, above.

HANDOUT: Gaffney, "Economics in Support of Environmentalism."

V. Water Marketing

A. The great potential benefits from better allocation. About-face of economists from passive complacency to dogmatic zealotry, synchronized with shift of major "stakeholders" from obstructing marketing to promoting it.

P&R, WHAT PRICE WATER MARKETING?, pp. 475-76;

P&R, WHOSE WATER? OURS, pp. 18-27;

B. Slow progress of move to marketing

P&R, WHAT PRICE WATER MARKETING?, pp. 478-80

C. Flaws in consumer sovereignty:

1. How prior distribution dominates allocation. Errors in The Coase Theorem.
P&R, WHAT PRICE WATER MARKETING?, pp. 491-93;
2. Legitimate demands that are not expressed via markets
P&R, WHAT PRICE WATER MARKETING?, pp. 483-84, on
"Unrepresented demands"; pp. 485-86 on water for fisheries;
P&R, Goldschmidt (Repeat, on town values);
3. Costs that are not expressed via markets
RBR, Non-point Pollution;
P&R, WHAT PRICE WATER MARKETING?, pp. 481-83;
RBR, Huffman, pp. 124-34, on external economies
4. Extinction of common rights in the process of privatization
P&R, WHAT PRICE WATER MARKETING?, pp. 486-90;
P&R, WHOSE WATER? OURS, pp. 32-36;
5. Self-generated demand from premature service to subeconomic lands
6. Undermotivated sellers
P&R, WHAT PRICE WATER MARKETING?, pp. 480-81;
6. Leaks in the market system - are they pluggable?
Uncontrolled Pumping,
P&R, WHAT PRICE WATER MARKETING?, pp. 481-84;
P&R, WHOSE WATER? OURS, pp. 6-10;
7. Racing for water-rents
P&R, WHAT PRICE WATER MARKETING?, pp. 493-95;

D. Private owners as champions of free markets: a temporary alliance of convenience?

History of bureaucrats promoting water marketing, and landowners blocking it.

P&R, WHOSE WATER? OURS, pp. 36-45;

P&R, WHAT PRICE WATER MARKETING?, pp. 495-99;

E. Analogous history: the forgotten reign of English doctrine of "free trade in land,"
recycled today as "the new resource economics."

Reading from A.R. Wallace

VI. Optimal pricing of water

A. Principles of marginal-cost pricing; fallacies of average-cost pricing.

RBR, James & Lee, pp. 544-45;

B. Increasing Costs in supply, storage and wheeling, coupled with Decreasing Costs in
distribution

P&R, Milliman;

C. Rent and value of water at the source

P&R, Taxable Surplus in Water Resources;

P&4, WHOSE WATER? OURS, pp.29-30

- D. Variable peak-pricing as substitute for excess capacity
- E. Zonal pricing to combat urban sprawl
- F. Tradeoffs in reservoir management
- G. Pump tax as a "Green Tax" surrogate for unitized management of aquifers. Who shall pay for recharging, and how, when waters commingle in aquifers?
 - P&R, WHOSE WATER? OURS, pp. 50-51;
 - P&R, WHAT PRICE WATER MARKETING?, pp. 481-82, 488
- H. Pricing and ownership: who has the right to collect for selling water?

I. Periodic payment vs. one-time sale of perpetual claims

J. Tokenism and its futility

P&R, WHOSE WATER? OURS 17-18;

VII. Designing and sizing water supply works, with rising demand

A. Biases toward oversizing: empire- and monument-building; cheap money; logrolling, state and federal; political power of materials suppliers, major contracting firms, law firms, financing firms, etc.

RBR, Water Supply, pp. 289-350;

P&R, Peripheral Canal, pp. 1-7;

RBR, Huffman, pp. 82-83

B. Biases toward undersizing: inadequate financing, pigmy dams built for claimstaking (rent-seeking), excess diversion capacity (claimstaking) coupled with inadequate delivery capacity (use and service).

RBR, Kaweah, Part II, Unreliability of Supply

C. Striking an optimal balance: When to build What?

Ecs. 148, Natural Resource Economics, Winter 2005

Prerequisite: Economics 102A, Micro-economic Theory

Class meets 10:10, MWF, OLMH 1123

Bases for grading: Final counts twice as much as midterm. These two exams, together, constitute your "Base Grade." Extra credit work and superior classroom performance (including quizzes) go on top of the base grade.

Weighting of classroom performance and extra work varies with quality. Do not ask, "How many points do I get for this?" Why not?

- 1, It varies from zero on up, depending on how good it is;
- 2, Asking that question makes a bad impression, indicating that you are less interested in the subject for its own sake, as befits a college student, and more interested in collecting "gold stars," as would befit an elementary school student. Extra credits **could** add from 1/2 a letter grade to a full letter grade to your "base" grade. There are no guarantees, however. The Instructor is the judge of quality. Any kind of plagiarism (which I hope never to see) would result in severe penalties.

More than 2-3 absences count as **negative** extra credit. (If you are sick, or in trouble, and have a documented reason, let me see the documents. Family outings and reunions and your cousin's wedding are not good reasons.) Drifting in late, or out early, makes a bad impression that may affect your grade – just as it would affect your prospects on a job. I am tolerant, but don't push it.

For extra work, clip a current newspaper article and explain its relevance to ideas discussed in the course and the readings. Your comments may be less than a page, or more if you have more to say. Hardly a week will pass without there being an article published dealing with resource economics generally, and water economics in particular. I will return up to five such papers per student, with comments which will be intended to help you do better on the next paper. One superior paper is worth more than five weak papers, so give each one care and thought. Credit will depend on quality and, of course, originality. A higher quantity is good in that it gives you more practise, but will help you only if you improve as you go. **If quality is low, more quantity will not improve your grade.** Deadline for submitting papers is the last day of teaching, but last-minute papers may be discounted. Earlier submission is better – much better.

Location of reading assignments.

The iLearn website.

Special case: The California Water Atlas (CWA). UCR has four (4) copies you may use. One is in the Science Library, reference section. Two are at the **Reference** (not Reserve) Desk, Rivera Library. A fourth one is in the Government Documents Section, Rivera Library.

Unit I: Geography of California water

- A, Major sources and uses of California water
Water use by crop. California Water Atlas (CWA) 82-83
Acres in various crops, by region. CWA 102
Interregional transfers. CWA 109
- B, California plumbing, macro and micro
City supply systems. CWA 28-37
Southern California system. RBR, Hirshleifer et al., Water Supply, Ch.11. (This is long; you may want to skim it for its geographical elements.)
The Great Central Valley. CWA 46-57
5 maps from Bain et al., to be distributed in class.
Statewide conspectus. CWA 70-71
- C, Aquifers: location, scarcity value, protection, management
CWA 68-69. Get the big picture, and try to locate the Cadiz Co. aquifer in the Mojave – it is in the news currently.
- D, Watersheds: location, scarcity value, protection, management
CWA 11, shows where the snowpacks are.
- E, Fisheries: location, protection, management
- F, Power drops
- G, Dam sites
- H, Reservoir sites
- I, Sumps, sewers, drainage
- J, Rights of way for aqueducts
- K, Rent and value of water and adjunct resources (damsites, aquifers, canal routes, etc.).
- Location,
 - elevation,
 - quality.
- Reading: "Taxable Surplus in Water Resources"**

Unit II: Landownership: concentration, dispersion, and reconcentration.

A. Prior landownership as basis for staking claims to water: land overlying aquifers, riparian land, land to support "beneficial use" in appropriative claims, "domestic use" priority for cities, land to enhance financial and political power of both private and semipublic agencies, land for rights-of-way (ROWs), etc.

P&R, "Whose Water? Ours," 45-47

B. Inflated water claims (rent-seeking) as basis of land speculation in urban sprawl;

P&R, "Rural-Urban Competition for Water," esp. pp.4-5

C. California history of land concentration, then subdivision, and finally reconcentration

1. 19th Century land monopoly, and economic stagnation. There are a lot of readings in this section. Don't let that scare you. Skim them, and focus on two or three that interest you the most. You'll never understand California until you learn this background. Did our ancestors ever start the race of life even? Not so far as any historian has observed.

RBR, George, Our Land and Land Policy, Chapter on California

RBR, Gates, "The Homestead Act ...", a chapter in Carstensen, 1962,

The Public Lands

RBR, Gates, "Public Land Disposal in California," a chapter in Shideler, 1975, Agriculture in the Development of the Far West

RBR, Gates, "The Henry George Era in California," a chapter in Lee, 1978, Four Persistent Issues

P&R, McWilliams, Factories in the Field, 11-27,

P&R, "Economic Development in California as a Response to Stress"

(CALSTRESS)

RBR, Worster, Rivers of Empire, 98-111;

Sheehan, 2 articles on the Miller and Lux Co. landholdings, in The Social Science Journal for April, 1983, pp.29-40, and January, 1985. These are in the general stacks – RBR will not circulate journals. Consider these optional. Sheehan was a grad student here.

RBR, Huffman, Irrigation Development and Public Water Policy, 19-20;

2. The era of subdivision, intensification, rural and urban development, 1900-1940

RBR, Henley, "Land Value Taxation by California Irrigation Districts," in Becker, Land and Building Taxation.

P&R, J. Rupert Mason, article on irrigation districts

RBR, Goldschmidt, 1946, As You Sow. (Skim, noting good sociological health of Dinuba, CA.)

P&R, Rural-urban Competition for Water

P&R, "Economic Aspects of Water Resource Policy," section 1, on irrigation districts.

P&R, CALSTRESS (repeat)

P&R, Troy, "California's Irrigation Districts," notes by M.G.

P&R, Rhodes, "The Thirsty Land," notes by M.G.

RBR, Huffman, Irrigation Development and Public Water Policy, 24-27

3. The Era of Reconcentration, 1940-date

P&R, "Who Owns Southern California?" (WHOOWNSC)
RBR, Gottlieb/Wolt, 1977, 500-09 (on water monopoly)
RBR, Gottlieb 1988, A Life of its Own, (skim)
RBR, Gottlieb, 1991; A Thirst for Growth (skim)
RBR, Worster, Rivers of Empire 242-47, 291-302
P&R, Goodall 1991, "Property and Water Institutions in California"
RBR, Fellmeth, The Politics of Land, Ch. 1 only
RBR, Roberts, Power and Land in California (an excerpt of the best economics from Fellmeth's somewhat flawed book)
RBR, Villarejo 1981, New Lands for Agriculture
RBR, Taylor 1949, "The Central Valley Project," in Taylor, 1979, Land and Law in California, pp. 228-37, 247-49, and 251
Arax, Mark, and Rick Wartzman, 2004. The King of California. J.G. Boswell and the Making of a Secret American Empire. New York: Public Affairs

4. Paul Taylor's Pyrrhic Victory: the landmark Ivanhoe decision, and the kickback

P&R, "What Price Water Marketing" 495, and notes 62-64;
P&R, Whose Water? Ours," 44-45;

5. Farms and cities

P&R, Rhodes (Repeat);
P&R, Goldschmidt, 1946, (Repeat);
P&R, Rural-Urban Competition for Water (Repeat)

D. Who owns Aquifers, Watersheds, Storage Sites, Power Drops, and Fisheries?
Who protects, manages and conserves them?

No reading assignment, but I refer to this in class from time to time, so keep alert to it as a topic (and possible exam question)

E. Land speculation

RBR, Huffman pp.57-65; 82-83

Bear in mind that all the material on landownership, and racing for water claims, is about "land speculation" in a wider sense than Huffman's narrow usage.

Unit III. Productivity and value of water

A. Data showing "average productivity"; data on marginal productivity. (By uses, regions, seasons, etc.)

B. Indications of waste through misallocation

RBR, "Diseconomies Inherent in Western Water Laws: a California Case Study" ("The Kaweah Study," for short). Section "A", pp. 1-16, evidences of differing marginal productivities of water within the system.

C. The anomaly of water (and energy) as "yield-cutting substitutes" - is it productive to cut yields, while cutting costs more? Neglect of this matter by "production economics" theorists. Effect of yield-cutting on the AP of water.

P&R, Quantum Leaps and Ecotones, pp. 1-5.

P&R, What Price Water Marketing, pp. 476-78;

P&R, Substitution, pp. 1-4;

P&R, Whose Water? Ours, pp. 4-6;

D. Power drops. Are they "non-consumptive"? The meaning and importance of "entropy," and how power drops subtract value by adding entropy.

P&R, Whose Water? Ours, pp. 30-31;

E. Rent and value of water: location, elevation, & quality.

P&R, What Price Water Marketing?, pp. 490-91;

P&R, Taxable Surplus in Water Resources;

P&R, Whose Water? Ours, pp. 29-30;

F. Negative productivity: runoff, drainage problems, salinity, pollution (point-source, and non-point), damage to natural instream uses, subsidence of aquifers, preempting storage capacity (from flood-control, power generation, recreation, etc.), loss of elevation, loss of quality, etc.

Economics and environmentalism: tradeoff, or symbiosis?

P&R, What Price Water Marketing?, pp. 484-86;

RBR, Non-Point Pollution: Tractable Solutions to Intractable Problems;

P&R, Whose Water? Ours, pp. 9-17;

Unit IV. Institutions controlling water "ownership" (licensure), allocation, storage, distribution, conservation and land use

A. Water law

RBR, Huffman, pp.37-39, 40-45, 45-49, 50-52;

RBR, "Diseconomies Inherent in Western Water Laws: a California Case Study" ("The Kaweah Study," for short), pp. 30-43, role of water law in blocking economical transfers.

P&R, Economic Aspects, pp. 136-41;

P&R, "Comparison of Market Pricing and Other Means of Allocating Water Resources," (alphabetized as "MAWR," in Vol. I); Read the entire article. Be sure your copy has all the pages in it – if some are missing, P&R has agreed to furnish you with replacement copies. This is a key reading!

P&R, Whose Water? Ours, pp. 1-4, 45-47;

B. Irrigation Districts (Wright Act, 1887; Denman amendments, 1909); Inclusion of cities;

P&R, Economic Aspects, to p.135 (repeat);

RBR, Albert Henley, "Land Value Taxation by California Irrigation Districts," in Becker, Land and Building Taxation;

P&R, J.R. Mason, article on irrigation districts (repeat);

RBR, Huffman, pp. 73-77, repeat;

P&R, Troy, notes by M.G., repeat

C. Mutual Water Companies

RBR, Huffman, 71-72;

D. Cities and Metro Districts

P&R, Rural-Urban Competition for Water, repeat;

P&R, WHOSE WATER? OURS, pp. 47-50;

P&R, WHAT PRICE WATER MARKETING?, pp.500-02.

E. Quasi-public water districts (legal powers and privileges of public bodies, but voting and leadership by ownership only)

P&R, Goodall 1978, notes by M.G., one page;

P&R, Goodall, 1991, pp. 1-15 + notes. (This unpublished MS, Goodall's last work, is direct and to the point, refreshingly free of the "safety-belt writing" that makes most texts and journal articles so dull and inconclusive.).

LIBRARY, California Water Atlas, pp. 63-64, text on "Water Districts in Calif.";

P&R, WHAT PRICE WATER MARKETING?, pp. 500-02;

P&R, WHOSE WATER? OURS, pp. 47-50

(For more on the MWDSC, Bradley and Morales edited a detailed report that you can order from the UCLA Library by Interlibrary Loan.)

F. State Agencies – early engineering dreams of statewide rationalization, The Marshall Plan of the 1920s. This was aborted by State bankruptcy in the 1930s. A part of the ambitious integrated plan was hived off to the U.S. Bureau of Reclamation, to get federal financing, and is now known as the Central Valley Project. In 1960 the voters passed (just barely) a huge state bond issue to begin the California Water Plan, (aka the Feather River Project, aka the California Aqueduct, aka the Burns-Porter Act). The California Department of Water Resources (DWR) is in charge, quickly growing into a mighty state agency and bureaucracy. Its major beneficiaries are vast holdings on the west side of the Tulare Lake Basin region and also south of the Tehachapis, whose owners wanted to avoid two federal policies: acreage limitation, and flexible water allocations.

Available from instructor for interested students: Sheehan, 1983

G. Federal Agencies

1. Bureaucrats as marketeers – the U.S. Bureau of Reclamation's program of flexibility and rationalization, and who curbed it.

P&R, WHAT PRICE WATER MARKETING?, pp.479-80;

2. Annihilating the Bureau of Agricultural Economics (BAE), sterilizing the U.S. Bureau of Reclamation, and magnifying the U.S. Army Corps of Engineers and California DWR: private political forces that shape bureaucrats, who then get the blame.

P&R, WHAT PRICE WATER MARKETING?, pp. 495-99;

RBR, Worster, pp. 245-49;

RBR, "Walter Goldschmidt's Baptism by Fire," in Taylor, Land and Law

in California;

P&R, WHOSE WATER? OURS, pp. 36-45;

RBR, Goldschmidt, As you Sow, pp.455-91;

P&R, (just following Factories in the Field), Goldschmidt 1991;

RBR, Worster 290-303

3. Congenital faults of Federal policy

P&R, Gaffney, "A Critique of Federal Water Policy" (CFWP)

Optional, by request. Gaffney, "Water, Politics, and Human Nature,"

from Challenge Magazine

H. Franchised power companies, and their licensure by FPC, FERC, et al.

(Like many other licensees, these have managed to turn their 40-year licenses into de facto perpetual ownerships, on "sweetheart" terms.) No reading assigned, but for some of their major power drops, see the Calif. Water Atlas.

I. Interstate and international issues

RBR, Huffman pp.53-56. (For more readings on this potentially explosive issue, ask the instructor. Students of international economics should know about the Jordan, Tigris and Euphrates, Nile, Rhine, Danube, Columbia, Colorado, Rio Grande, and other hot spots.)

J. Tradition of subsidy to water wastage: farm preferences; exploitation of the aquifer depletion treadmill

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P&R, WHAT PRICE WATER MARKETING?, pp.484-85

K. Case study: the Kaweah River service area

RBR, Kaweah study. Review parts previously assigned, and now study the rest of it: Part II, on wastes in the system; and Part IV, on Dynamics of the System;

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M. The test of taxability: is water taxable property?

P&R, WHAT PRICE WATER MARKETING?, pp. 488-90

N. Environmental law; symbiosis of economists and environmentalists (Who else "speaks for mankind"?). See III, F, above.

HANDOUT: Gaffney, "Economics in Support of Environmentalism."

Unit V. Water Marketing

A. The great potential benefits from better allocation. About-face of economists from passive complacency to dogmatic zealotry, synchronized with shift of major "stakeholders" from obstructing marketing to promoting it.

P&R, WHAT PRICE WATER MARKETING?, pp. 475-76;

P&R, WHOSE WATER? OURS, pp. 18-27;

B. Slow progress of move to marketing

P&R, WHAT PRICE WATER MARKETING?, pp. 478-80

C. Flaws in consumer sovereignty:

1. How prior distribution dominates allocation. Errors in The Coase Theorem.

P&R, WHAT PRICE WATER MARKETING?, pp. 491-93;

2. Legitimate demands that are not expressed via markets

P&R, WHAT PRICE WATER MARKETING?, pp. 483-84, on

"Unrepresented demands"; pp. 485-86 on water for fisheries;

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RBR, Non-point Pollution;

P&R, WHAT PRICE WATER MARKETING?, pp. 481-83;

RBR, Huffman, pp. 124-34, on external economies

4. Extinction of common rights in the process of privatization

P&R, WHAT PRICE WATER MARKETING?, pp. 486-90;

P&R, WHOSE WATER? OURS, pp. 32-36;

5. Self-generated demand from premature service to subeconomic lands

6. Undermotivated sellers

P&R, WHAT PRICE WATER MARKETING?, pp. 480-81;

6. Leaks in the market system - are they pluggable?

Uncontrolled Pumping,

P&R, WHAT PRICE WATER MARKETING?, pp. 481-84;

P&R, WHOSE WATER? OURS, pp. 6-10;

7. Racing for water-rents

P&R, WHAT PRICE WATER MARKETING?, pp. 493-95;

D. Private owners as champions of free markets: a temporary alliance of convenience?

History of bureaucrats promoting water marketing, and landowners blocking it.

P&R, WHOSE WATER? OURS, pp. 36-45;

P&R, WHAT PRICE WATER MARKETING?, pp. 495-99;

E. Analogous history: the forgotten reign of English doctrine of "free trade in land," recycled today as "the new resource economics."

Reading from A.R. Wallace

Unit VI. Optimal pricing of water

A. Principles of marginal-cost pricing; fallacies of average-cost pricing.

RBR, James & Lee, pp. 544-45;

B. Increasing Costs in supply, storage and wheeling, coupled with Decreasing Costs in distribution

P&R, Milliman;

C. Rent and value of water at the source

P&R, Taxable Surplus in Water Resources;

P&4, WHOSE WATER? OURS, pp.29-30

D. Variable peak-pricing as substitute for excess capacity

E. Zonal pricing to combat urban sprawl

F. Tradeoffs in reservoir management

G. Pump tax as a "Green Tax" surrogate for unitized management of aquifers. Who shall pay for recharging, and how, when waters commingle in aquifers?

P&R, WHOSE WATER? OURS, pp. 50-51;

P&R, WHAT PRICE WATER MARKETING?, pp. 481-82, 488

H. Pricing and ownership: who has the right to collect for selling water?

I. Periodic payment vs. one-time sale of perpetual claims

J. Tokenism and its futility

P&R, WHOSE WATER? OURS 17-18;

Unit VII. Designing and sizing water supply works, with rising demand

A. Biases toward oversizing: empire- and monument-building; cheap money; logrolling, state and federal; political power of materials suppliers, major contracting firms, law firms, financing firms, etc.

RBR, Water Supply, pp. 289-350;

P&R, Peripheral Canal, pp. 1-7;

RBR, Huffman, pp. 82-83

B. Biases toward undersizing: inadequate financing, pigmy dams built for claimstaking (rent-seeking), excess diversion capacity (claimstaking) coupled with inadequate delivery capacity (use and service).

RBR, Kaweah, Part II, Unreliability of Supply

C. Striking an optimal balance: When to build What?