

**From:** Michael Rozengurt [\[mailto:rozengurt@earthlink.net\]](mailto:rozengurt@earthlink.net)  
**Sent:** Wednesday, April 06, 2011 4:50 AM  
**To:** Alvarez, Eric@DeltaCouncil  
**Subject:** about water

*Dear Eric,*

*I send you a couple of documents that may widening the question of interest.*

*Michael*

Introduction.

**Dear Friends of Rivers, Deltas, Estuaries, and Coastal Waters,**

You may appreciate the significance of the attached letter to fmr. Gov. Jerry Brown, son of the famous "Father of the State Water Project". It suggests that the 1982 Bond issue for the Peripheral Canal anal was a heart attack in waiting when one understands that Mother Nature can only give up 25-30 of her average annual runoff to support all the needs of man. More than this and the system itself goes belly-up, which is exactly has happened since this historic watershed when the son rejected the final piece of the father's dream.

This was the guy called "Gov. Moonbeam" for his radical ideas about alternative energy sources powering the state's future. See what that idea got us, then reach for your wallet!

We all remember the telecast on the eve of the election, when son Jerry carefully reviewed his famous graphs to explain the effects of the project on water supply and the San Francisco Bay-Delta. And then took his stand neither for nor against the Department of Water Resources last grand attempt to replumb the heart of this rich ecosystem, and thereby sealed his future political fate.

Now, decades later, the lesson must be taught again. The CalFed program is trying to do the same end-run of the Delta, in order to improve water quality and yield of the project along with even more dams. This time Dianne Feinstein has joined in with a bill that guarantees farm water but not fish water. Again we say no, the 50-80% average water withdrawals have already caused a loss of over 90% of the biological remnant that was left back in the 1960-70s. How's a fish to live out of water?

What do you think? Write Governer Davis, Brown's former lieutenant, and remind him that fish were born to swim, not walk through the mud filling the dams and canals of the State Water Project.

Retirees for more free flowing waters. Here is the letter that was sent to any entitis and persons who were involved in saving the **DELTA - SAN**

**FRANCISCO BAY.**

\*\*\*\*\*

\*

\*\* Letter to Governor J.Brown

June 20, 1980

**Honorable Governor**

**Jerry Brown**

Sacramento

California

This letter is being written to appraise you of certain facts which must

be considered in your deliberations on the Peripheral canal issue currently before the California legislature and being discussed almost daily in the news.

This issue has not only statewide, but national significance, as an example of large scale water development for which important ecological, economical, and social effects have already been demonstrated in similar programs of other nations.

The following facts are apparent to us, as professionals examining the demise of the San Francisco Bay Delta; some of these derive directly from observing the corpses of other similar ecosystems abroad:

1. There should be no further water projects' constriction, including the Peripheral canal, until such time as new cost-benefit analyses have been done and predictions are made as to the relation between Delta outflow and (a) salt intrusion in San Francisco Bay, (b) pollution and waste treatment needs and (c) productivity of the entire system.
2. There should be no further water withdrawals from the existing Delta pool as history both here and abroad has shown severe economic and environmental damage results from greater than 30 % reductions in the natural flow.

The lack of data to understand this system and to make adequate predictions is appalling and must be corrected immediately by a major research effort.

This must lead to a proper monitoring program to prevent future problems. The cost of these programs is estimated as at least \$2 million per year, but this is minuscule compared to the \$11 billion expenditure contemplated for replumbing the system to meet only man's perceived needs.

3. The primary question which must be answered prior to any further water development (or replumbing) is the following "What is the natural limit water withdrawls from the Sacramento River and its Delta?"

The experience of foreign countries is frightening: diversion of no more than 30 to 50 % of the normal ,natural runoff ( computed as averaged for 55 years) has led to serious immediate consequences and subsequent , successive degradation of resources, including finally the destruction of the diverted water supply itself due to salt intrusion from an adjacent estuary and sea . Note that these results did not occur all at once, but developed slowly at first and more rapidly toward the end.

June 20, 1980

This result could be predicted at the outset, for its is quite evident

now in well documented case histories. The total time span involved in the above events was measured in years, not decades or centuries, from the point of withdrawals beyond 30% of the natural, spring outflow. This leads us to predict that "25-30 % is nature's limit!" We note with alarm that withdrawals from the River-Delta currently exceed 50%, with eventual projections scheduled for 75% or more of the normal, natural flows.

We predict that the system will collapse long before this point is reached, although we would not be pleased to see this prediction come true. More to the point, we feel that there is an immediate need to protect the Delta from the already observed salinity intrusions resulting from excessive water development. Dams and the Peripheral Canal cannot correct maintaining of a positive balance of brackish and fresh water exchange necessary to sustain natural estuarine conditions, created by Nature. Other solutions exist and should be examined for their applicability to this important problem.

**The Peripheral canal**, by itself, cannot flush this system and cannot prevent the salt intrusion water already occurring with alarming frequency. Such a canal will destroy even more of the natural circulation and exacerbate chemical and biological deltaic environment. This is directly opposite to nature's way of enriching the system with a meandering flow and its natural reversals (due to tides and winds, not pumping activities).

A similar, to proposed one, the Peripheral Canal was built on the eastern part of Volga Delta in 1974 to restore the low river- delta tributaries. Here anadromous (beluga, sevruga, sturgeon) and semi-anadromous fish (herring, shad , others) migrate to spawn, and feed. But the Canal nearly stop these activities . And due to excessive upstream and downstream water development , the fishery had declined precipitously.

We would point out that the Delta is not plumbing water distribution system. Historically, any delta is the heart of a rich productive river ecosystem. It receives nutrients from upstream; produces, processes and circulates its own additional nutrients within its fresh and brackish water body; and subsequently affects the rich productivity of the estuary ( bay ) and even the coastal sea. Any change in the course of this vital bloodstream or in the quality of its fluids will lead to change, much of which has already been shown to be detrimental to societal and economic as well as ecological systems.

My colleague and I represent almost 50 years of working experience in marine and estuarine biology, hydrology, and oceanography. This experience is directly pertinent to the problems faced today by the Delta - San Francisco Bay system. Our collective experience leads us to state that, without doubt a final result of further water developments will lead to economic, societal, and ecological ruin for the Delta - Bay for the predominant residual runoff to the San Francisco Bay corresponds to years of subnormal wetness or drought.

Published results regarding similar water development abroad (the Rivers Don and Kuban, the Volga and Terek, the Dnieper and Dniester, and the Nile and Po, which enter the Azov, Caspian, Black, and Mediterranean Seas, respectively) all point to the inescapable conclusion that no more than 25-30 % of the natural flow can be diverted

without disastrous consequences. The historical, average annual Delta outflow tributary to northern San Francisco Bay was 28.5 MAF (1871-1929) and is presently about 14 MAF, a 50% reduction. A similar runoff decline had occurred in 1923-24 and led to very serious effects even prior to major water developments. This natural lesson should be kept in mind when discussing eventual projections of 75% water withdrawals from the Sacramento River in 1990.

**The early warning signs of this excessive withdrawal are apparent in the reduced productivity of fish and wildlife resources, increased salinity intrusion affecting municipal and agricultural water supplies, increased effects of pollution loads in progressively more stagnant waters, and both subtle and gross changes in the delta system's configuration and flow pattern.**

These impacts are all the same in kind (not yet in degree) as have been thoroughly documented elsewhere. As such, equal or greater disruption to the ecology and basic economy of this system can be expected in the future. Taken together, these findings adequately demonstrate that the costs of eventual losses, where they are fully known or projected, far exceed any short-term benefits gained.

More importantly, it has also been demonstrated that many engineering works designed specifically to mitigate prior environmental disruption only exacerbated the problem and accelerated the eventual outcome. Detailed reports have been published over the past decade which have addressed the problems of water resources development leading to the subsequent destruction of the resource itself.

We are scientists and cannot advise you on the difficult political realities of this general problem. Nor can we understand the approach of some engineers: "first must build and answer questions later." "Final answers to many of our most perplexing questions must be derived from the construction and operation." This quote was attributed to former Director Harvey Banks in the fifties (New West Magazine, June 16, 1980). We do know that if one follows nature's example, and answers the questions the same manner that nature has, then the result will be safe for both the environment and man.

Yours very truly,

Irwin Haydock, Ph.D. ( Marine Ecology)

Michael Rozengurt, Ph.D., P.E. (Oceanography, Hydrology)

From: mrozensgurt  
Full-Name: Michael Rozengurt  
To: CALFED  
Fcc: Sent  
Date: Tue, 21 Jul 1998 22:35:47  
Subject: mrozensgurt: No one can get something from nothing (Universal Physics)  
Message-ID: <19980721.223458.18527.3.mrozensgurt@juno.com>  
X-Status: Forwarded  
X-Mailer: Juno 1.49

----- Begin forwarded message -----

From: mrozensgurt  
To: hans.wolter@fao.org, kuylenstierna@un.org, terttu.melvasalo@unep.org  
Subject: No one can get something from nothing (Universal Physics)  
Date: Thu, 16 Jul 1998 23:50:52  
Message-ID: <19980716.235004.2311.0.mrozensgurt@juno.com>

=====

To whom it is of concern:

-----  
-----

The following statement I submitted to Cal-Fed ( Coalition of California State and Federal Regulatory Agencies) in regard to the latest feeble attempt to fix the broken Sacramento - San Joaquin delta-San Francisco Bay ecosystem by use the sophisticated engineering alternatives built in the Delta whose controversial plumbing will further facilitate systemic water starvation of the deltaic migration, spawning, breeding, and feeding ground for estuarine-depended fishes and else.

May 5, 1998

CalFed Public Hearing

University High School

4771 Campus Drive

Irvine, CA 92716

Subject: March 1998 Draft Programmatic EIS/EIR

---

On the subject of CalFed's EIS/EIR, I would like to bring to your attention that the major threat to Californian riverine and coastal ecosystem health and sustainability is caused by excessive impoundment of rivers by dams and the subsequent water diversion for human usage.

We must remember that Nature has a limit, and work wisely within that framework to serve humankind.

The significance of this threat to the Nation's water quality and resources of coastal ecosystems and their economics and societal infrastructure has not been appropriately recognized or appreciated by CalFed. As a result of dams and diversions, coastal ecosystems have been suffered from immense economic and ecological penalties similar to that documented in the former U.S.S.R. (Rozengurt and Herz 1981; Rozengurt, et al. 1985, 1987; Rozengurt and Haydock 1981, 1991, 1993).

Since the late 1960s in the former U.S.S.R., 30 major and 100s of minor dams on rivers of the Black, Caspian, Azov, and Aral seas' basins have retained 60 to 97% of spring freshwater flux. Subsequently, this impoundment and enormous cumulative losses of over hundreds of

millions of acre-feet (hundreds of cubic kilometers) of runoff have inflicted a mortal blow to habitat and destroyed migration, spawning and nursery grounds of 90-98% of the valuable species of recreational and commercial fish in the southern U.S.S.R. Economic losses for fishery alone have amounted up to \$4 to 5 billion per year with thousands of boats and hundreds of thousands of fishermen out of work.

Today, no one in Russia uses the word "restoration." All attempts to restore the fisheries have failed - the current habitats have nothing in common with their teeming past. Within just twenty years, all seas were transformed into "blue deserts."

The Aral Sea has ceased to exist. Salt dust and toxins blown from the sea bottom fell back to earth and destroyed crops for hundreds of miles downwind. Contaminated drinking wells make the infant mortality in Central Asia's ( the Aral Sea watershed) nearly five times the Soviet

average - a staggering 10 to 20% of all babies born. (Is this a future threat to the Owen's Valley population?)

In general, since the 1970s the southern watersheds of the former U.S.S.R. have symbolized management's staggering ignorance of major Laws of the Universe (thermodynamics) which govern ecosystem sustainability (Rozengurt, 1993, 1994, Rozengurt and Hedgpeth, 1997). As a result, the past misguided search for short-term economic gain has not been rectified by an overhaul of the entire system.

Unfortunately, California's water management appears to follow the same path of the entire arid and semi-arid southwest "Sunbelt" where burgeoning water development is only slightly less ominous than that in the Black, Azov, and Caspian seas' watersheds (Rozengurt and Hedgpeth, 1989).

I determined for Russian rivers over twenty years ago, and in the 1980s for the Sacramento - San Joaquin rivers, that when annual water withdrawals exceed 30% (or 50 to 90% of normal spring runoff) then the estuary's natural functioning is largely destroyed or brought to the brink due to enormous cumulative water deficits and watershed desiccations by dams and diversions. Other examples, besides the Sacramento-San Joaquin river delta-San Francisco Bay-coastal ecosystem are: the Snake River/Columbia River and coastal zone; Florida's "Everglades," and Florida, Tampa, and Charlotte bays; the Nile River Delta; some 40 estuaries of the Gulf of Mexico, especially several in Texas; and the Chesapeake Bay ( Halim, 1991; Robinson 1981; Rozengurt et al., 1987b; Simenstad et al., 1992;).

This implies the following summary facts:

- (1) all these systems and the entire Central and South Atlantic and Western Pacific coastal waters have been deprived of many thousand millions of acre-feet of runoff that it is vital for their survival;
- (2) the remnants of residual or "regulated" flow often correspond to an actual dry year or a chronic drought condition from the perspective of functioning of ecosystems regardless of wetness of the year; and
- (3) progressive entropy (system agony resulting from Second Law of Thermodynamics) is now a permanent feature of human-influenced riverine - deltaic - estuarine- coastal ecosystems' regime.

The cumulative effect of these related processes eventually leads to the demise of the water body itself (for example, the Delta-San Francisco Bay system), the same as we would die of such a constant hemorrhage of our blood. In addition to destroying valuable fisheries, large-scale freshwater diversions have jeopardized the deltaic drinking freshwater intakes themselves due to an inexorable increase of brackish or salty

water intrusion (Second Law) and made some formerly lush regions uninhabitable to humans (example, Aral seas, Owens Lake, Colorado Delta).

In terms of relative scale, I believe that flow diversions dwarf both wetlands' losses and pollution as threats to the "health" of coastal ecosystems and their living marine resources.

This threat of continued excessive water diversions on the California water resources should be a primary focus of called. However, they have allocated no funds to address this problem and no mention is even made in their studies. [This same lack of recognition is reflected in the EPA's Environmental Monitoring and Assessment Program (MAP), and in USES water quality studies.]

I believe that called should therefore be directed to provide the leadership in assessment of limitations in water development as it affects fisheries and other resources. Their immediate task should be to review the full significance of the threat and to formulate plans based on natural sustainability and the environmental, economic, and societal compatibility of water development by different water users. This may halt trends apparent here and already realized in the despoliation of former Soviet Union's estuarine - marine ecosystems. Such work would be invaluable for alternative political, economic and ecological decision-making by California's administration.

I urge you to facilitate a more rational water policy based on the fact that:

1. California possesses only 28.5 MAN of normal, unimpaired runoff over a perennial period (averaged over 60 years) in the Sacramento - San Joaquin watershed. This amount determines entirely the survival of the Delta - San Francisco Bay and the State's precious coastal resources;
2. Spring runoff, the lifeblood of any water system, has already been reduced to 10 to 30% of what once was around 11 MAF on average (as computed over 55 to 60 years, averaged, normal, unimpaired runoff);
3. Since 1955 the Bay has deprived over 600 MAF(million - acre- feet, or 720 cubic kilometers) of freshwater runoff, and millions of tons of organic and inorganic matter, suspended sediment, oxygen, and etc. left behind the dams and in water conveyance facilities;

According to physics, "No one can get something from nothing."  
California's water management has already reached NOTHING. Any talk about "Restoration" of the Delta or Bay is a dangerous fallacy! I appreciate this opportunity to comment on CalFed's ambitious but flawed report.

Sincerely,

Michael A. Rozengurt, Ph.D., P.H.

Physical Oceanographer and Hydrologist

Huntington Beach, CA

REFERENCES CITED:

1. Halim, Y. 1991. The impact of human alterations of hydrological cycle on ocean margin. In Ocean Margin Processes in Global Changes (Eds. R.F.C. Mantoura, J.M. Martin and R. Volast). John Wiley & Sons LTD
2. Robinson, A.E. 1981. Chesapeake Bay low freshwater inflow study. In: R.D. Cross and D.L. Williams (eds.), Proceedings of the National Symposium on Freshwater Inflow to Estuaries II:114-127. U.S. Department of the Interior, Washington, D.C.
3. Rozengurt, M.A. and M.J. Herz. 1981. Water, water everywhere but just so much to drink. (pp. 65-67) Oceans. Sept.
4. Rozengurt, M.A. and I. Haydock. 1981. Methods of computation and ecological regulation of the salinity regime in estuaries and shallow seas in connection with water regulation for human requirements. In: R.D. Cross and D.L. Williams (eds), Proceedings of the National Symposium on Freshwater Inflow to Estuaries II:475-507. U.S. Department of the Interior, Washington, D.C.
5. Rozengurt, M.A., M.J. Herz, and M. Josselyn. 1985. In: D.L. Goodrich (ed.) San Francisco Bay: issues, resources, status, and management. NOAA Estuary-of-the-Month Seminar Series No. 6. (pp. 35-62) NOAA, Washington, D.C.
6. Rozengurt, M.A., M.J. Herz, and S. Feld. 1987a. Analysis of the Influence of Water Withdrawals on Runoff to the Delta - San Francisco Bay Ecosystem (1921 - 1987). Technical Report No. 87-7 (Library of Congress, # 2 091 239) Tiburon Center for Environmental Studies, San Francisco State University, Tiburon, CA.
7. Rozengurt, M.A., M.J. Herz, and S. Feld. 1987b. The role of Water Diversions in the Decline of Fisheries of the Delta - San Francisco Bay and other Estuaries(1921-83). Technical Report No. 87-7. Center for Environmental Studies, San Francisco State University, Tiburon, CA.
8. Rozengurt, M.A., and J.W. Hedgpeth. 1989. The Impact of Altered River Flow on the Ecosystem of the Caspian Sea. Reviews in Aquatic Sciences Vol. 1, 2, pp. 337-362.

Rozengurt, M.A. 1991. Strategy and ecological and societal results of extensive resources development in the South of the U.S.S.R. In: Proceedings, The Soviet Union in the Year 2010. USAIA and Georgetown University, Washington, D.C.

9. Rozengurt, M.A. and I. Haydock. 1991. Effects of fresh water development and water pollution policies on the world's river-delta-estuary-coastal zone ecosystems. In: H.S. Bolton (ed.), Coastal Wetlands Volume, Coastlines of the World. (pp. 85-89) Coastal Zone '91, Proceedings of the Seventh Symposium on Coastal and Ocean Management. American Society of Civil Engineers, New York, NY.

10. Rozengurt, M.A. 1992. Alteration of freshwater inflows. In: R.H. Stroud (ed.), "Stemming the Tide of Coastal Fish Habitat Loss." Marine Recreational Fisheries Symposium 14:73-80. National Coalition for Marine Conservation, Savannah, GA.

11. Rozengurt, M.A. and I. Haydock. 1993. The role of inland water development on the systemic alteration of the coastal zone environment. In: Proceedings of Watershed '93, A National Conference on Watershed Management. U.S. EPA, Washington, D.C.

12. Rozengurt, M.A. 1994. Running on Empty: the distortion of coastal ecosystems. In Proceedings of 7th International Biennial Conference and Coastal Seas: Buoyancy Effects on Coastal Dynamics. Woods Hole Oceanographic Institution. Woods Hole, MA USA.

13. Rozengurt, M.A. and J.W. Hedgpeth. 1997. Distortion of thermodynamic equilibrium of watershed - coastal seas' ecosystems. In Proceedings "With Rivers to the Sea, Interaction of Land Activities, Fresh Water and Enclosed Coastal Seas". Joint Conference: 7th Stockholm Water Symposium and 3rd International Conference on Environmental Management of Enclosed Seas (EMECS). 10 - 15 August. Stockholm, Sweden.

14. Simenstad, C.A., D.A. Jay and C.R. Sherwood. 1992. Impacts of watershed management on land-margin ecosystems: the Columbia River Estuary. In: R.J. Naiman (ed.), Watershed Management, Balancing Sustainability and Environmental Change. (pp. 266-306) Springer-Verlag, NY.

Tolmazin, D.M. 1985. Changing coastal oceanography of the Black Sea. Prog. Oceanog. 15:217.

-----  
-----

Note: 1, 12, and 13 were added for the enclosed original text to highlight the nature of discussion.

----- End forwarded message -----

----- End forwarded message -----

----- End forwarded message -----



Subject: Letter to the President  
Date: Wed, 10 Jun 1998 14:42:09 EDT

---

May 23, 1998

The Honorable William J. Clinton  
President of the United States  
The White House  
Washington, D.C. 20050

Dear Mr. President:

We thank you for the giant environmental step your administration has taken in sponsoring the National Ocean Conference (NOC) in Monterey CA on June 11-12. This crucial forum will have lasting impact if you use the opportunity to make clear that there is a vital connection between a naturally functioning watershed and the sustainable riches of its coastal zone. Over 500 billion dollars has been spent since 1970 to rid this nation of water pollution; at least as much will now be expended to improve the health and management of our watershed-coastal zone complex. It is still not well understood that watersheds and their coastal zones form a single complex ecosystem; damage to one reach is eventually seen in the other. We wish we could be at the June NOC to make this point. But as you gaze over Monterey Bay, where a huge river once cut a channel deeper than the Grand Canyon, be aware that all the natural aquatic ecosystems of California are in danger of disappearing along with their adjacent coastal zone resources. The MBNMS is not the only system in danger.

Northern California is presently struggling to save the "broken delta" of the Sacramento-San Joaquin rivers, while planning to withdraw even more water to satisfy the contracted "needs" of agriculture, industry and a burgeoning population. In the Southern California Bight, 26 major and some 150 minor waterways have been damned and depleted, leading to major declines in coastal resources. Massive efforts to severely reduce pollution coming from 15 million inhabitants and their industries have not brought concomitant resource recovery in this area. Similar water development schemes elsewhere have presented us with severe resource problems in the Colorado and Columbia river systems, Gulf of Mexico, and East Coast and Florida bays and estuaries.

For too long we have failed to understand the nature of this link, and have blamed a multitude of other sins (habitat destruction, pollution, overfishing, and, now, even global warming) for the obvious decline in our sea's resources. As those bright fellows Sir Isaac Newton and Albert Einstein taught, you can't get something from nothing! Although each new sin may compound our problems, without some remaining semblance of a naturally functioning watershed the coastal zone resources will continue to decline, costing our economy billions.

Even the now protected Monterey Bay National Marine Sanctuary (MBNMS) will not survive, and this fact will not change much by further scientific studies of pollution, overfishing, or other concerns not related to the overarching problem of fresh water depletion. We have been looking in the wrong place for the cause of the ocean's decline! It is time to focus on the critical link between watersheds and seas. It's the water that forged and strengthened this link over the past several thousand years.

Decades of careful study and experience has shown us this problem stems primarily from the cumulative effects of dam building and subsequent freshwater diversions to serve human needs.

A practical limit is diversion of more than 25-30% of the average natural freshwater runoff . Exceeding this amount has denied coastal waters of billions of tons of sediments, nutrients, oxygen, and other trace materials. These elements, along with the natural hydrological mixing and entrainment processes of Spring flushing, are essential to maintain even a small part of the formerly teeming coastal zone sustaining 90% of our most important fish and shellfish resources. Not every drop of water reaching the sea is wasted (contrary to the cries of water developers). The long-term, cumulative effects of runoff depletion on the delta-estuary-bay-coastal complex have just begun to receive wider attention. Future work deserves an integrated system approach that can only be accomplished by the wonderfully diverse talents brought together for your NOC.

Please raise the bar by challenging them to work in concert with other estuarine and freshwater stake-holders to research, develop and manage lasting solutions for all future generations.

These facts have long been apparent to us, are well documented globally and are clearly seen in ecosystems destruction in the former Soviet Union, including a shriveled Aral Sea, drastic increase salinity concentration in western Black Sea and entirely Sea of Azov, and 150 billion dollars in lost fishery catch in the Black , Azov, Caspian, and Aral Seas.

Elsewhere in Asia and the Middle East, the water supply crisis has advanced to the stage where the looming issue is "environmental security." This strategic aspect of water is now becoming more prominent in our daily news.

Mr. President, your trip west in June would be seen by us as a great success were you to call attention to the role played by runoff in maintaining the rich and abundant productivity of the nation's watershed ecosystem (river-delta-estuary-bay-coastal zone complex). Use this opportunity to announce initiatives to determine the appropriate division of this nation's fresh water, halting the cumulative effects that diversions have already had on formerly rich estuarine and coastal waters. Until watershed limits are determined in a comprehensive, integrated way we predict continued decline in renewable resources and further degradation in coastal water quality.

This fact will eventually result in even more serious consequences than just the "water wars" we are continually trying to avoid here in that continue to inhibit progress in understanding the bigger picture of the nature of water and its vital role in maintaining our priceless coastal zone.

Respectfully,

Irwin Haydock, Ph.D.; Aquatic Ecologist, Fountain Valley, CA Michael Rozengurt, Ph.D., P.H. (Oceanographer and Hydrologist). Together representing over 80 years of watershed-coastal zone science and management. Huntington Beach, CA.

cc: Honorable Vice President, Al Gore, Kathleen A. McGinty, Chair, CEQ; Senator Barbara Boxer, Senator Diane Feinstein, Congressman Sam Farr, Congressman Dana Rohrabacher

### **Selected References.**

Robinson, A.E. 1981. Chesapeake Bay low freshwater inflow study. In R.D. Cross and D.L. Williams (Eds.) Proceedings of the National Symposium on Freshwater Inflow to Estuaries,. U.S. Department of the Interior, Washington, D.C., Vol. II:114-127

Rozengurt, M.A. and M.J. Herz. 1981. Water, water everywhere but just so much to drink. Journ. "Oceans". Sept., Pp. 65-67.

Rozengurt, M.A. and I. Haydock. 1981. Methods of computation and ecological regulation of the salinity regime in estuaries and shallow seas in connection with water regulation for human requirements. In R.D. Cross and D.L. Williams (Eds.), Proc. of the National Symposium on Freshwater Inflow to Estuaries U. S. Department of the Interior. Washington, D.C., Vol. II: 475-507.

Rozengurt, M.A., M. J. Herz, and M. Josselyn. 1985. In D.L. Goodrich (Ed.) San Francisco Bay: issues, resources, status, and management. NOAA Estuary-of-the-Month,, Washington, D.C, 6: 35-62

Rozengurt, M.A., M.J. Herz, and S. Feld. 1987a. Analysis of the Influence of Water withdrawals on Runoff to the Delta-San Francisco Bay Ecosystem (1921-83). Technical Report No. 87-7. Center for Environmental Studies, San Francisco State University (CESSFSU) , Tiburon. CA.

Rozengurt, M.A., M.J. Herz, and S. Feld. 1987b. Technical Report No. 87-8, CESSFSU

Rozengurt, MA, and J. W. Hedgpeth. 1989. Impact of Altered River Flow on the Ecosystem of the Caspian Sea. Journ." Reviews in Aquatic Sciences" Vol. 1, 2: 337-362.

Rozengurt, M.A. 1991. Strategy and ecological and societal results of extensive resources development in the South of the U.S.S.R. In " The Soviet Union in the Year 2010." USAIA and Georgetown University, Washington, D.C.

Rozengurt, M.A. and I. Haydock. 1991. Effects of fresh water development and water pollution policies on the world's river-delta-estuary-coastal zone ecosystems. In: H.S. Bolton (Ed.), "Coastal Wetlands Coastlines of the world." (Coastal Zone 91) Publ. ASCE, NY. 85-89

Rozengurt, M.A. 1992. Alteration of freshwater inflows. In R.H. Stroud (Ed.) "Stemming the Tide of Coastal Fish Habitat Loss." Marine Recreational Fisheries Symposium 14:73-80. National Coalition for Marine Conservation, Savannah, GA.

Rozengurt, M.A. and I. Haddock 1993. The role of inland water development on the systemic alteration of the coastal zone environment. In Proc."Watershed 93", U.S. EPA, Washington, D.C.

Simenstad, C.A., D.A. Jay and C.R. Sherwood,. 1992. Impacts of watershed management on land-margin ecosystems: the Columbia River Estuary. In R.J. Naiman (Ed.), Watershed Management, Balancing Sustainability and Environmental Change. Springer-Verlag, NY. (pp. 266-306)

Tolmazin, D.M. 1985. Changing coastal oceanography of the Black Sea. "Progress in Oceanography". 15:217.















rather diluted, and then can step in with you clear-cut proposal. Go for it.  
Good luck.

D.Tolmazin Ph.D

.#####

t o: Michael Rozengurt <mrozengurt@juno.com>

From: URL: http://www.ovi.ca E-mail: mcall@superaje.com

Dear Michael,

That is an immensely powerful yet compact statement of implications of the massive construction of artificial reservoirs in this century. The runoff lock-up have a series of implications for riverine and coastal ecosystems . The only comparable statement I had seen was for Hudson Bay where it was said that accumulative effects of hydroelectric dam construction in its drainage basin had lead to a 50% increase in winter runoff. The concomitant reduction in spring runoff, I hazarded in a popular paper, would influence ice breakup times, nutrient surfacing due to reduced entrainment, coastal water warming (ice reflects solar radiation), etc.

The implications of reservoir lock-up of runoff are complicated by deforestation (presumably speeding up runoff) and especially agriculture (presumably speeding up runoff and adding nutrients from fertilizers and pesticides). How do these daming, deforestation and agriculture interact? Would you be willin to publish these observations in Sea Wind, bulletin of Ocean Voice International?

Don McAllister

Don E. McAllister /& Canadian Centre for Biodiversity  
Ocean Voice International /Canadian Museum of Nature  
> Box 37026, 3332 McCarthy Rd. /Box 3443, Station D  
> Ottawa, ON K1V 0W0, Canada /Ottawa, ON K1P 6P4  
> (or: ah194@freenet.carleton.ca) Tel: (613) 264-8986, Fax: (613) 264-9204  
\*\*\*\*\*

From: Don McAllister mcall@superaje.com  
To: Michael Rozengurt mrozengurt@juno.com  
Date: Mon, 28 Feb 2000 08:48:21 -0500

Subject: **Running on entropy: Some preliminary thoughts inspired by Rozengurt's 1999 Running on entropy.**

Thank you for sending your stimulating paper. I have read your paper with deep interest. It raises, as your earlier papers have, profound questions about the impacts of impoundment of rivers. Especially valuable is the calculation of truncation levels beyond which ecosystems will be severely impaired. Thanks for writing such as stimulating paper. It is a major contribution. I do hope that you continue in this line of research.

.Cordially, Don McAllister

