August 8, 1998

Comment By BDAC Member Alex Hildebrand On The
Review Of The CalFed Water Use Efficiency Component
That Was Presented By Dr. Peter Gleick

Introduction

At the July 1998 meeting of the CalFed BDAC a document was presented by Dr. Peter Gleick of the Pacific Institute for Studies in Development, Environment, and Security. The document is a critique of the CalFed Water-Use Efficiency Component. It was developed with grant money from the USBR. It had not been submitted in advance, and there was no opportunity for discussion of its content.

The purpose of this memo is to analyze Dr. Gleick's explicit and implicit assumptions, and his apparent conclusion that we can count on reductions in per capita use of water that are large enough to largely eliminate the mismatch between supply and need that will otherwise occur as the population grows. I also propose a better basic approach to resolving the current disagreement over the need for new water development.

Basic Approach

CalFed has concentrated on restoration of the Bay Delta ecosystem and has tried to limit the extent of its consideration of overall water management in the Central Valley. However, it is not possible to isolate the ecosystem's water needs from the adequacy and management of the State's water supply for other competing uses, particularly as it derives from the Central Valley watershed. I agree with Dr. Gleick that the adequacy of the water supply must be assessed in regard to its adequacy to meet competing needs of the future 2025 population in a publicly acceptable manner.

Neither Dr. Gleick, nor CalFed, nor Bulletin 160-98 starts by considering the future need for water related amenities, domestic use, commodities, industrial products, food, the environment, and the jobs associated with these water uses. If this were done, it would then be possible to assess the water that would be needed to meet each of these needs at present levels of water-use efficiency. The potential for meeting each of these needs with less water could then be examined with due regard to technical feasibility, cost, and public acceptance. Apparently Dr. Gleick was not asked to do this.

In the absence of any such quantification of the range of reasonable outcomes, we have some who fervently believe that the future population and the

environment can be satisfied and protected by better water-use efficiency without any substantial increase in the above surface retention of flood waters for use in dry years. Other parties believe equally fervently that the level of increase of water-use efficiency that is technically and financially feasible and also publicly acceptable will be inadequate to substantially close the gap between future supply and a publicly acceptable level of future need. These latter parties also believe that it takes so long to build facilities for new water yield that we can not wait to first test the potential for an adequately large reduction in per capita water use. Dr. Gleick does not appear to take either of these extreme views. However, I don't believe that his paper will provide much help in resolving this issue. I will next examine some of his assertions.

Reductions in Applied Water versus Future Demand

Dr. Gleick appears to assert on page 10 and Figure 1 that if a city in an inland valley reduces its per capita diversion of applied water, its consumptive use of water will also be reduced in the same proportion. If the reduction in applied water is due to low flow toilets and more efficient clothes washers the per capita consumptive use will not change. If it is due to fewer lawns and swimming pools, it will change in some degree. Dr. Gleick maintains that reductions in non-consumptive use also reduce "demand". In the Central Valley it is only reductions in consumed water that reduce the need for new water supplies.

Agricultural Water Needs

Dr. Gleick focuses substantially on agricultural water use. I suggest that we could start with the per capita water supply required for transpiration in growing a nutritious food supply. We can then use present figures for the current evaporative and other water losses associated with providing that transpiration. This total water supply needed to grow food for an individual can then be multiplied by the future population to determine the total agricultural water needed with present water use efficiency. During less than the 30 year time frame of the CalFed Plan we expect twenty million more Californians, ninety million more people in the United States, and two billion more worldwide. California provides 25% of the Nation's food supply. For starters, we could assume that there are no changes in net imports or exports and assume that we continue to feed California and 25% of the Nation. This would give us a figure for the consumptive agricultural water supply needed with present efficiency of water use. This number is far more than proposed in Bulletin 160-98 and includes both surface and well water. Groundwater overdraft is reducing the availability of well water, so the future mix would have to include more surface water. The transfers from agriculture to other uses that CalFed anticipates will further reduce the current agricultural water supply. A little arithmetic will show that the per capita supply of water in 2025 for consumptive use in producing food will be less than half of its present level if

if new supplies are not developed. The question then is whether the efficiencies proposed can enable us to grow more than twice as much food per acre foot of consumptive water use. Alternatively should we plan to produce less food? With that in mind we can examine Dr. Gleick's analyses.

Pricing

Dr. Gleick anticipates that increases in consumptive water-use efficiency would result from raising water prices. This may be true to some degree. However, the efficiency of agricultural water use in water short areas that use imported water is driven more by scarcity than by price unless the price forces a farmer out of business.

Changes in Agricultural Water Management

Dr. Gleick examines past trends in the use of agricultural water application technology and postulates that these trends will continue, and that they will in some degree reduce water losses by evaporation. These trends will no doubt continue in some degree. However, drip irrigation, for example is expensive. The necessary investment can not be safely put at risk if CalFed's Plan will reduce the assurance of dry year agricultural water supply in order to increase the assurance of dry year supply for urban and environmental uses. The same is true of shifts to permanent crops. Increased yields attributable to drop irrigation are achieved because drip enables a plant to consume more water and not because there is more growth per unit of water transpiration.

Changes in Per Capita Urban Water Use.

Dr. Gleick raises plausible questions regarding the basis for urban applied water demand, e.g., Table I2, page 27. However, in inland areas it is only reductions in consumptive use that have much effect on the State's overall water supply. Water that is not consumptively used is not lost in the Central Valley. It either gets back to the stream system or percolates to groundwater. In either case it is recovered and reused for some beneficial purpose.

Water Reuse

In coastal regions where salt can be disposed to the ocean, it appears that more consideration should be given to water reuse by reverse osmosis of brackish water to reduce salinity. More attention should also be given to using non-potable water to flush toilets. This requires some additional plumbing, but in 30 years 40% of the population will be living and working in buildings that have not yet been built.

Crop Changes

Dr. Gleick seems to suggest that decisions on cropping patterns should not be left entirely to individual farmers. He implies that crop shifts should in some way be induced to reduce water demand. This implies that crop selections should not be based on the consumer needs and preferences that each farmer strives to accommodate to the extent possible with his costs, risks, soils, climate, etc. Furthermore, a farmer's crop options will be further limited if CalFed encourages dry year fallowing in order to increase water reliability for other uses. When a farm business is suspended, it can not meet bank payments, keep its work force, or maintain its food processing and service industries. Having the government intrude in crop decisions in any manner is no more reasonable than it would be if the government promoted decisions to shift industrial production so as to produce only those products that can be made with little water use.

Weed Control

Dr. Gleick suggests that water could be saved by better weed control. However, farmers are also urged to use less herbicide. Many of these weeds are introduced species. This argument should apply also to the aquatic environment. If exotic aquatic species were controlled, it would take a lot less streamflow to maintain a given level of natural species.

Environmental Water

Dr. Gleick does not address the level of demand and the efficiency of environmental water use. CalFed proposes to convert agricultural lands to wetlands. These wetlands will consume much more water than when the land is used to produce food. This increase in water supply demand must come from a reduction in some other use or from increases in the State's water supply. CalFed also encourages more flooding of rice lands and Delta corn lands for waterfowl. This is good, but it takes water. More wildlife refuges and more riparian vegetation also take more water. As we increase these water consuming land uses we must again have more water, and CalFed should quantify this.

Summary

Dr. Gleick is correct in stating that we must attempt to quantify the extent to which better water-use efficiency can contribute to reducing the water supply needed to supply all beneficial purposes. He is also correct in acknowledging that this effort can not lead to a dependable quantification. However, to the extent that the quantification can be made, it alone will not answer the question of whether better efficiency can adequately reduce the mismatch between supply and demand. We must bracket the uncertainty in that potential mismatch by looking at

the demand with present levels of efficiency and the demand with those improved efficiencies that we believe could reduce the overall water demand to the degree believed to be technically and socially acceptable.

Dr. Gleick suggests possible approaches to increased efficiency. Some of these have merit. He doesn't adequately distinguish between reductions in consumptive use and reductions in applied use. The latter do not typically affect the overall water supply in an inland valley. He also does not acknowledge the substantial increase in environmental water supply which CalFed proposes. He, like CalFed and Bulletin 160-98, ignores the need to feed the future population. The State has no plan for providing the future food supply. He, therefore, does not directly address the question of whether his proposed increases in efficiency are likely to be a substantial substitute for an increase in Central Valley water yield. The only real source of an overall increase in yield is to capture water otherwise released during floods and save it for dry years. At other times the entire water yield in the Central Valley is already being beneficially used at present levels of water use efficiency.

Dr. Gleick has contributed some interesting suggestions, but has not compared supply and demand. He was not asked to do so. His paper will not therefore, resolve the disagreement between those who believe that no new water yield is needed, and those who believe that substantial new yield is essential.