

U.S. Paradigm Shift Required: Science To Provide Water

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Jan. 17—In reprinting the chapter below, “Solve the World Water Crisis,” by Benjamin Deniston, from the *EIR* Special Report, “The New Silk Road Becomes the World Land-Bridge,” released last month, we are underscoring the point made by Franklin Delano Roosevelt years ago: Reaching for the frontiers of science gives you the ability to deal with present-day crises. During the FDR Administration, breakthrough work was done in atomic research, plant genetics, and other branches of science, at the same time that millions of jobs were created to relieve suffering, and build the nation. There is no conflict between long-term commitments, and short-term emergency measures. Only if we pursue the frontiers of progress, can we succeed in taking the actions for the immediate crisis.

Over the months since Deniston wrote his 2014 world water review, a successful demonstration of this principle has been shown in China, in the opening of the central branch of the South-to-North Water Diversion Project. Over Fall 2014, the reservoir swelled behind the heightened Danjiangkou Dam; the conveyance channels were activated to move water northward; and on Dec. 28, Beijing received its first “new” water supplies. The system diverts flow from the water-plentiful Yangtze River Basin to the dry north, through some 1,200 km of canals and pipes.

This grand water project in China—part of an overall Eurasian infrastructure drive, especially high-speed rail—is an inherent part of China’s national commitment to *progress as a policy*, whose leading edge is space research, and a helium-3 fusion-power transformation. This development principle is guiding the initiatives of the BRICS—Brazil, Russia, China, India, South Africa—and collaborating nations.

In contrast, in the United States, the destructive Federal policy is causing physical economic and social collapse, as a “necessary evil” to support the dead Wall Street/City of London financial system. U.S. space and fusion



The Danjiangkou Dam on the Han River, the principal reservoir for the middle line of the South-to-North Water Diversion Project, was heightened to increase its impoundment volume, over a construction period from 2005 (shown here) to 2010. The dam was raised 14.6 m, from 162 m to 176.6 m.

research have been all but cancelled. In per capita and per unit area terms, U.S. essential physical measures are in absolute decline overall—power, water, agro-industrial production. But monetarist speculation and bailout are increasing beyond measure.

Because of decades of this deadly program, the planned and required Western water diversion systems—proposed in the 1960s as NAWAPA (North American Water and Power Alliance)—were never built. Counterparts to the modern South-North Water Diversion in China, these systems would have supported the expanded economic activity, and biosphere improvements, in ways to enhance mankind's ongoing ability to defend against planetary climate shifts from solar and galactic cycles. Nor were nuclear-powered, seawater desalination systems ever installed, as once intended by the Eisenhower and Kennedy administrations. Now the entire region west of the Mississippi River is in crisis, from the Kansas wheatlands to California's Central Valley.

All 22 states west of the Mississippi River are affected. In the southwestern states, 98 million people are facing vanishing water supplies. California, with 38 million people, may run out of water in 18 months. Many communities are now supplied by truck.

NASA Studies Document Scale of Crisis

In addition to the immediate challenges, there is reason to expect that the current dry spell could continue for decades, or even centuries. This is in line with such patterns over long-term geo-history. Recent studies of

climate changes in this Western region over thousands of years, show periodic, extreme variations, ranging from megadroughts, to mega-flooding.¹ Paleo-climatologist B. Lynn Ingram, at the University of California at Berkeley, recommends that California prepare itself for a megadrought that could persist for 200 years or more. In fact, in terms of the long-term record, the last 100 years ranks as a relatively wet and stable century in the West.

For the present, NASA satellite data-based analyses, and on-the-ground readings, are documenting the severity and consequences of the worsening aridity. A NASA study released in July 2014,² showed that the Colo-

rado River Basin—whose drainage boundaries cover parts of seven dry Western states and northern Mexico—has lost a huge volume of groundwater over the last 14 years. The reservoirs behind the dams and the groundwater are drying up. This threatens water supplies for 40 million people, irrigation for 4 million acres of farmland, and the means to life throughout the region. Scientists at NASA and University of California Irvine conducted the study, covering nine years, using data from NASA's GRACE (Gravity Recovery and Climate Experiment) satellite mission to track changes in the water mass, on and below the surface in the Colorado River Basin.

A NASA press release summarized: "Monthly measurements of the change in water mass from December 2004 to November 2013 revealed the basin lost nearly 53 million acre feet (65 cubic kilometers) of freshwater, almost double the volume of the nation's largest reservoir, Nevada's Lake Mead. More than three-quarters of the total—about 41 million acre feet (50 cubic kilometers) was from groundwater."

Another study looked at the entire Western region, inclusive of the Colorado River Basin, and found the desiccation so severe that the Earth's surface is measurably rising. Researchers monitoring earthquake activity

1. "The West Without Water: What Past Floods, Droughts, and Other Climatic Clues Tell Us About Tomorrow," by B. Lynn Ingram and Frances Malamud-Roam; Berkeley: University of California Press, 2013.

2. *Geophysical Research Letters*, American Geophysical Union, "Groundwater Depletion During Drought Threatens Future Water Security of the Colorado River Basin." July 24, 2014.

in the West reported their findings in August 2014: “that the growing, broad-scale loss of water is causing the entire western U.S. to rise up like an uncoiled spring.”³ Scientists at the Scripps Institute of Oceanography, at the University of California San Diego, analyzed precise GPS readings on the Earth’s surface, from 772 stations across the Western states, between 2003 and March 2014, and found a clear pattern of rising ground levels. The stations are part of the Plate Boundary Observatory of the National Science Foundation and other networks.

The U.C. San Diego website reported that the researchers “found that the water shortage is causing an uplift effect up to 15 millimeters (more than half an inch) in California’s mountains and on average four millimeters (0.15 of an inch) across the west. From the GPS data, they estimate the water deficit at nearly 240 gigatons (63 trillion gallons of water). . . .” They call the deficit “equivalent to a 10 cm layer of water over the entire region.”

The BRICS & LaRouche’s Four Laws

The Western states crisis is an imperative for the forcing of a sudden, complete policy shift in the United States—and the global context for such a shift already exists. A formal invitation for this was given to the United States in November 2014, when Chinese President Xi Jinping presented President Obama with an offer for the United States to join with the BRICS in their campaign for world development.⁴

Earlier, in June 2014, Lyndon LaRouche had already laid out the principles of the required policy shift for the United States, under the title, “Four New Laws To Save the U.S.A.: Not an Option: An Immediate Necessity” (see *EIR*, Jan. 9, 2015).

First, there must be the reinstatement of the Glass-Steagall law, as a “principle of action” which restores the basis for sound banking and credit.

Secondly, there must be, “a return to a system of top-down, and thoroughly defined as National Banking.” This calls for the activation of the authority of the Federal government, as posed by our first Treasury Secretary, Alexander Hamilton, to initiate credit and practices for the general good, overriding regionalism.

Thirdly, use must be made of the Federal credit

system to “generate high-productivity trends” in employment, and initiate projects serving the purpose of “creating a general economic recovery,” premised on increases of national energy-flux density.

Fourthly, we must “adopt a fusion-driver crash program.”

Taken together, these define the principles by which the United States can emerge from its present breakdown crisis, and re-enter the frontiers of human progress in collaboration with other leading nations.

LaRouche’s call for increasing national economic energy-flux density is critical to addressing the U.S. water crisis. For example, start with the depletion rates of major aquifers and groundwater supplies west of the Mississippi. According to various studies, California’s Central Valley aquifer is losing about 1.5 km³ of water per year, the Colorado River Basin is losing 5-7 km³ per year, and the High Plains Ogallala Aquifer is losing about 5 km³ per year.⁵

In an initial approximation, this loss of ~13 km³ per year could be overcome by using nuclear power to desalinate ocean water, providing new freshwater supplies—a process which can be supported by increasing the total power per capita and per square kilometer (energy-flux density) of the relevant populations and territories. For California (and the Central Valley aquifer), this would require increasing the power per capita and per square kilometer by 0.5-1% of current values; for the entire Southwest (considering the Central Valley aquifer and groundwater of the Colorado basin), an increase of about 1-2% in the power per capita and per square kilometer would be required; and for the combined territory of the Southwest and the High Plains, the needed energy-flux density increase would also be about 1-2%.

Approached in these physical-economic terms, merely a few percent increase in these regional metrics of energy-flux density could address the Western water depletion crisis, and ensure the survival of these territories.⁶

Going to a higher level, the operation of NAWAPA, as a *continental* water-management system, would re-

3. “Ongoing Drought-Induced Uplift in the Western United States,” A. Borsa et al., *Science*, August 2014.

4. This occurred in Beijing at the 2014 Asia Pacific Economic Cooperation (APEC) summit. Washington has ignored the opportunity. See the LaRouchePAC petition, “[U.S. Must Join the BRICS!](#)”

5. These values should be taken as rough estimates, and are, if anything, lower than the actual loss rates. See Section I (“Dimensions of the Crisis”), Part B (“Groundwater Depletion”) of the accompanying report for details.

6. Compare this, for example, with the current power per capita requirements for general transportation in the United States: *nearly 30% of the total power per capita*.

quire an increase of the continental power per capita and per square kilometer of 2-5% (depending upon the scale of implementation), and would create the potential to address all immediate and long-term water needs of the continent (doubling the water availability for entire states), creating the potential for immense economic growth and development.

The survival of the United States depends upon such active interventions to increase mankind's power to change and improve the national territory. The United States must again come to realize that the survival of mankind depends upon the continual physical-economic improvement and progress, as measured by increasing energy-flux density, for example.

Without this paradigm shift—amounting to a return to the American System—no resort to “water emergency measures”—however well intended—will save the day.

USA Stuck in a Fishbowl?

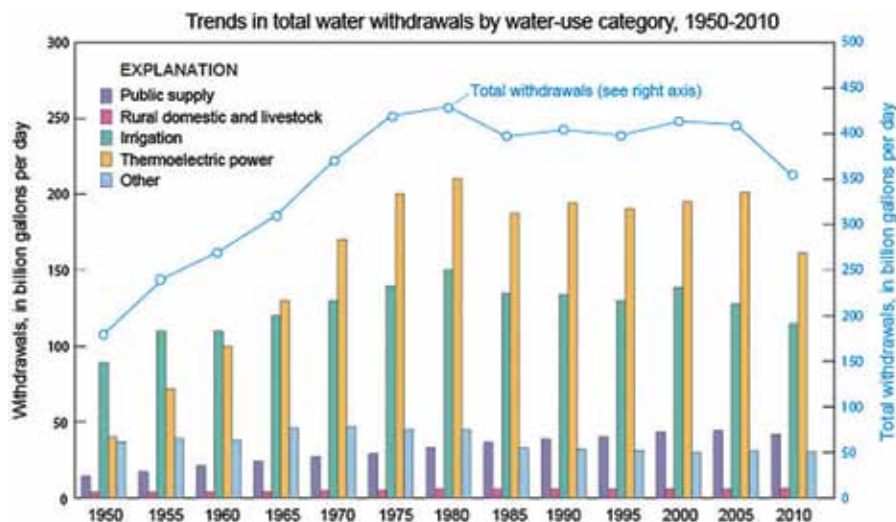
There is an old tale of the fish that spent so much of his life swimming circles in the small confines of his fishbowl that once he was released into the ocean, he lived out his days continuing to swim in the same tight circles. Despite the vast open potential of his new environment, the fish was so accustomed to his old way of life, that his *old habits* became his new cage—his *own habituation* to tired old practices kept him from the immense possibilities before him.

Are we not reminded of the United States today?

Despite the depths of the crisis, and the new global context of the emergence of the BRICS system, lawmakers in the United States have still stuck to a tired, old array of small and practical “water emergency measures” habits, which will, at most, provide some temporary regional relief, while the systemic nature of the crisis continues to destroy the region.

For example, on Jan. 14, a “Water in the 21st Century” bill was introduced into the House of Representatives by California Rep. Grace Napolitano (D) (who had also introduced it in July 2014), and into the Senate by Barbara Boxer (D-Calif.). The bill's measures, to be funded by various Federal grants and rebates, range

FIGURE 1



from collecting storm water, to “studying” desalination, to promoting water-saving household appliances.

More seriously, this month, the state of Kansas is discussing a newly released Army Corps of Engineers study on running a 360-mile canal across the state, to convey Missouri River flow to farmland. The study sees a 20-year, \$18 billion construction project.

Taken altogether, the varied contingency measures underway or under discussion throughout the drought-stricken states, amount to a grab-bag of whatever the affected communities or states hope to be able to pay for, from trucking in water, to building coastal desalination plants (all non-nuclear), to recycling sewage effluent. The Federal government remains hands-off, per Wall Street.

Even if the “best” of these measures were agreed to, they don’t defend against long-term weather pattern shifts; nor do they stand a chance, given that the U.S. economy itself is in breakdown. In fact, it is “drying up.”

Figure 1 presents the trend of total water used in the United States, at five year intervals, 1950 to 2010.⁷ It shows that the volume of fresh (mostly) water used for all purposes in the United States today, has now fallen back to the same level that it was 45 years ago. What are referred to as water “withdrawals” have been declining for 30 years, from 430 billion gallons per day (Bgal/d)

7. “Estimated Use of Water in the United States in 2010,” U.S. Department of the Interior and U.S. Geological Survey Circular 1405, November 2014.

down to 355 Bgal/d in 2010 (including some saline water, as well as fresh). Total water withdrawn fell by 13% in just five years, from 2005 (at 409 Bgal/d) to 2010.

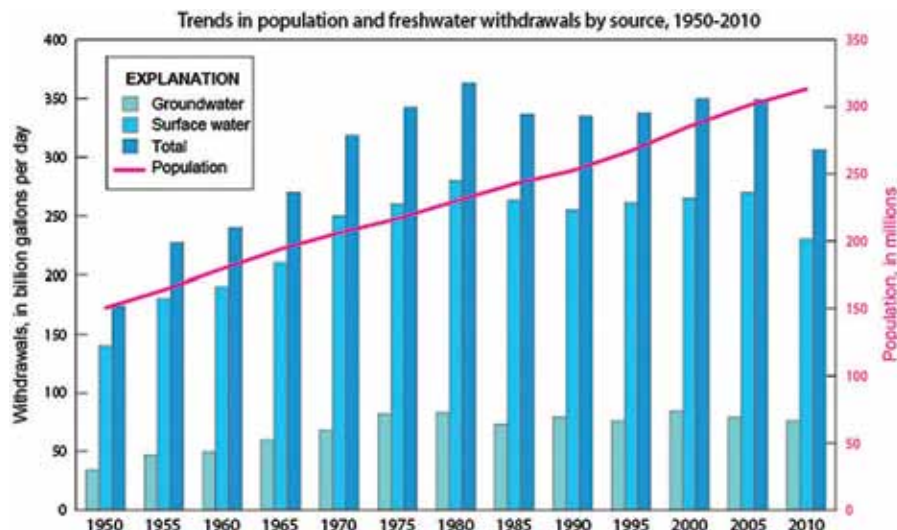
The largest declines, by category, include the following:

- Use for thermoelectric power dropped 20%. This reflects, in part, certain improved efficiencies in cooling, and in the main, reflects power plant closures and a decline in coal-fired generation. This is a large category of use.
- Use for manufacturing (from self-supplied industrial withdrawals) dropped 12%. Apart from some efficiencies and recycling, the decline reflects the decrease in U.S. industrial production, especially since 2008.
- Use for irrigation dropped 9%. Apart from some efficiency improvements in water application technology, the decline in water volume represents a decrease in food-producing capacity. Moreover, the interesting fact noted in the USGS report, that the national irrigated area grew by 2 million acres over this five-year period, is accounted for only by the undesirable trend in which Nebraska has superseded California in size of area irrigated, and Nebraska is using its expanded irrigation to produce corn for ethanol—a degraded energy mode.
- Use for public water supply declined, despite a 4% increase in the population. The per capita use by those served by public water systems fell from 100 gallons per day in 2005, to 89 in 2010. (Public supply refers to centralized water systems, large or small, in contrast to wells, streams, and other private sources.)

Obama Administration spokesmen at the Interior Department have hailed this dismal picture as helping to “sustain the limited freshwater resources in the country.” The USGS, for the first time since its water use survey began in 1950, delayed getting the report out, for two years.

Figure 2 presents the trend of total water “withdrawals” from 1950 to 2010, by source of the water. Though not spelled out explicitly on the graph, the implication is stark: that over time, as less surface water is available—now at crisis conditions in the West—groundwater is sought, but aquifers are depleting. The situation is untenable.

FIGURE 2



Food Crisis

The Western drought and national policy crisis constitute an automatic food crisis. Look at the year-end reports of the 2014 agriculture losses in California, which for decades, has been the leading state supplier of many basic foods, from dairy (20% of U.S. milk production), to field and orchard crops (60% of U.S. fruits and vegetables, overall), and over 90% for nuts and many specialty crops.

NASA remote sensing analysis shows that a huge area, 1.7 million acres, was not planted in California’s Central Valley last Summer, for lack of water. As of July 27, there were 1,706,038 acres idled. This is about 20% of the total irrigated area of 9 million acres throughout the state, but concentrated in the Central and Imperial valleys, which are among the world’s highest-yield cropland.⁸

Since California alone accounts for 43% of the national acreage in use for production for fruits, vegetables, and tree nuts, according to the 2012 Census of Agriculture, the scope of the national food crisis is clear. Of all U.S. farms engaging in production of produce and nuts, 22% are in the state. Nearly all of their acreage is irrigated, and now lacking in water. The breakdown in California includes, by type of agricultural land, and percentage of it irrigated: 98% of orchards;

8. “Public Update for Drought Response,” issued in November 2014, by California state agencies, pursuant to the April 2014 declaration of a continued state of emergency. NASA led the study, the third year in its new five-year program to use satellite imagery to estimate vegetative status.

100% of cropland for berries; 100% of land planted to vegetables.

The immediate prospects for 2015 are terrible. As of December 2014, 78% of California remains in exceptional or severe drought. One third of the state's water comes from snowmelt, from the Sierra Nevada Mountains, which run some 400 miles north-south on the eastern border. In April 2014, at what would have been the peak of the snowpack, it was only 18% of the normal depth at that time. The low snowpack continues this Winter, at a level of only a third of what was once considered normal.

California:

Fruits. Production is declining or threatened with decline across the board in all these crops, for which California ranks first in the nation, in terms of percentage of national output, as of 2012 (shown in parentheses): apricots (88%), avocados (88), raspberries (74), fresh strawberries (91), grapes (91), kiwi fruit (97), lemons (92), nectarines (95), olives (96), peaches (73), plums (97).

Nuts. California tree nut output accounts for virtually all of U.S. walnuts, almonds, and pistachios, and groves are currently maintained only at the expense of

water for other uses, and, in any case, future production is entirely at risk.

Rice. The 2014 rice crop was down some 25% from the year before, and in decline for the third year running. Most of the U.S. medium-grain rice is grown in California, and nearly all the short-grain rice used for sushi. About half the state's rice has been exported in recent years, mostly to Asia.

Wheat production is down over half. The 2014 Winter wheat harvest, in the range of 430 thousand tons, is the lowest since 1968; durum wheat, at 78,000 tons, is the lowest since 1977. (Data: USDA National Agricultural Statistics Service)

With differing particulars, the food production capacity is similarly stricken in Texas, Oklahoma, Kansas, and other parts of the High Plains and West. The total U.S. cattle herd has decreased back to the size of 1951. In Texas, the leading cattle state, beef cow numbers were 5.35 million head in 2005, but by 2014, had fallen to 3.91 million.

However, the most horrifying and dangerous feature of the Western water crisis is not the drought, but the continued toleration of the Wall Street/London regime that dictates nothing can or will be done.

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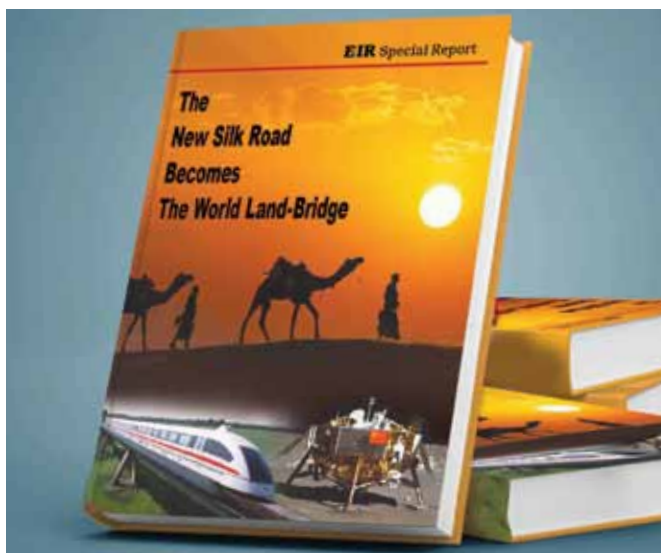
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