# The Nuclear-Thermonuclear NAWAPA XXI

by Benjamin Deniston

*This report, issued as a 21st Century Science & Technology offprint, is the first of a package to be published by the LaRouchePAC Basement Research Team, under the title, "Increasing the Productivity of the North American Water Cycle: The Nuclear-Thermonuclear NAWAPA XXI." The project will focus on the concept of increasing the energy-flux density, a measurement for the power of man over nature, in a human economy.*

July 28—NAWAPA XXI provides the central pillar for saving the economies of the North American continent and beyond, securing water, food, and agricultural supplies for the three nations directly involved, but also securing a grip on the future itself. This program will have large-scale implications for key nations in Asia, and potential ramifications for the entire world.

The immediate food crisis—threatening Americans with starvation—is one of the most stark expressions of the physical breakdown of the U.S. economy that Lyndon LaRouche has warned of and fought against. To be absolutely clear, there is no monetary or financial solution to the current crisis. There is not even a possible recovery of the previous system, as such.

The immediate reinstatement of Glass-Steagall is the only emergency action that can stop a hyperinflationary disintegration of the financial system and remove Wall Street's deathgrip on America. While this will halt the imminent financial collapse process, and eliminate the supranational control Wall Street has exerted over our nation, Glass-Steagall, alone, will not create a new economy for the American people.

Glass-Steagall must be tied with the re-establishment of a Hamiltonian credit system, through which Federal credit will be directed to the physical-economic growth of the nation. This is not just giving money within the present system—it is the creation of a new system, one premised on a very specific, particular type of growth.

America does not need a "recovery," but a *new economy*. This means not simply rebuilding what was lost, but *leapfrogging to qualitatively higher levels*. Higher conceptions of economy, including understanding the true role of mankind in managing and improving the biosphere—as by the massive control and direction of water—are demanded in order to solve the agricultural and food crises, while improving the overall territory of the West.

This requires that the original NAWAPA design be upgraded, to a nuclear-thermonuclear mode, providing not only more desperately needed water, but doing so faster, with less loss, and with an international commitment to the development of a nuclear-thermonuclear economic platform.

Human development, in its essence, is just that: a series of leaps, from one level to the next, higher level.

The NAWAPA XXI Continental Water and Power

FIGURE 1

*Schematic map of the NAWAPA XXI project (the improved and expanded North American Water & Power Alliance), a continental-scale water management project, harnessing fresh water runoff from Alaska, Yukon, and British Columbia, and redirecting it into the interior of the continent, creating vast new resources for agriculture and industry.*

Management System, driven by a nuclear-thermonuclear mode, will provide the next, desperately needed leap. This includes acting on the critical water multiplier factor provided by plant life itself, enabling the highest rate of re-utilization of water per cycle (**Figure 1**).

Water is not an object that gets used up. NAWAPA XXI relies on higher levels of energy-flux density to increase the density of productive utilization and re-utilization of the water, per cycle. Tapping into this plant-driven multiplier factor will actually increase, in physical terms, the productivity and value of the water cycle of the entire North American continent, something many self-proclaimed "environmentalists" don't seem to understand.[1]

## Why NAWAPA XXI Will Work

The problem in most Americans' understanding of this challenge—aside from outright environmentalist brainwashing—lies in the false belief in a self-determined economic value of goods, such as the idea of some intrinsic value of a gallon of water per se. Even worse, there is the clinical insanity in the religious-like worship of some self-evident value of money. The influence of Wall Street, in this regard alone, is now threatening the very destruction of America—in the promotion of the insane belief that there is some need to save hyperinflated "ones and zeros" (but mostly zeros) in a computer-based gambling house called Wall Street.

To illustrate the absurdity of this view, take an actual growth program. By enabling and allowing more plant life to exercise its hydrological recycling capabilities, NAWAPA can increase the productivity of the water cycle of the entire North American continent, without having to increase the water input.

The original 1960s design would have made significant progress in this regard, but being based on hydro-

1. Although the "Greens" are responsible for the genocidal consequences of their actions, the fault lies comparatively less among the poor duped "believers" in the general population, and more directly with the Anglo-Dutch empire that created and shaped the entire environmentalist movement for their explicit intention of stopping progress, and reducing the world's population. Today, that means the reduction from 7 billion down to 1 billion, or fewer. Queen Elizabeth's royal consort Prince Philip, on the British side, and the late Prince Bernhard, on the Dutch side, led in the creation of "environmentalism." The pro-Nazi history of both these figures is illustrative of their genocidal inclinations—inclinations that only became further developed following World War II. Queen Elizabeth proclaimed herself to be the leader of this genocidal effort, as she declared in the lead-up to the failed Copenhagen Climate Summit in the Winter of 2009.

power to power the pumps, it had a ~45% loss factor built in. However, NAWAPA XXI's employment of higher levels of energy-flux density changes that. The secret lies in the interrelationship of increasing energy-flux density, and increasing water-cycling density per square kilometer.

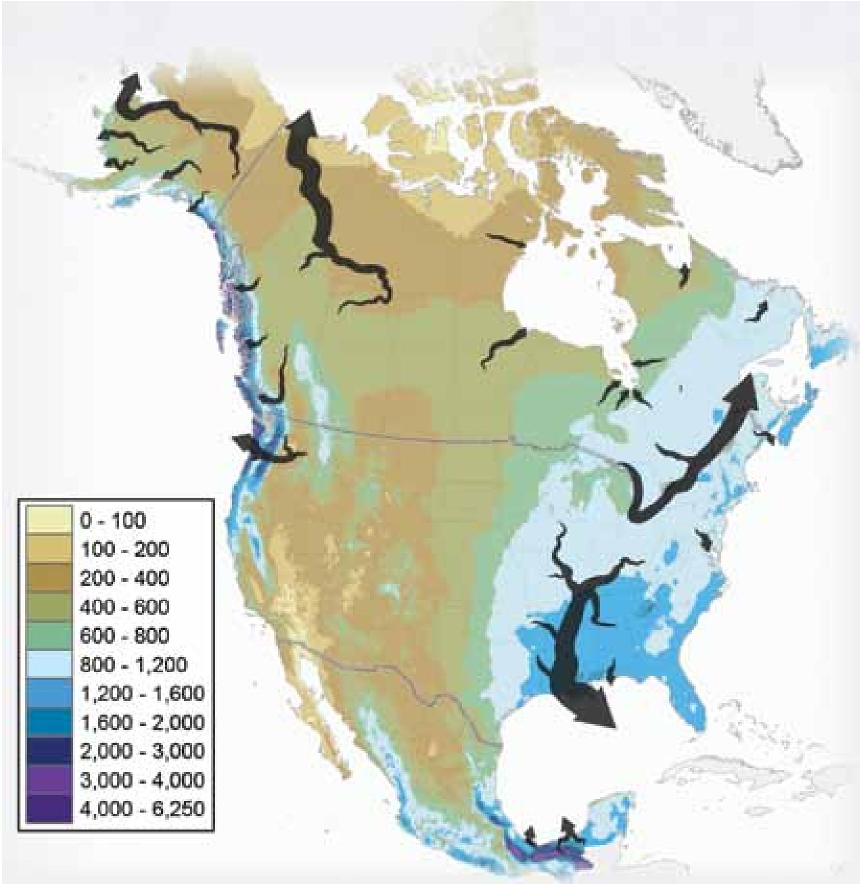
While NAWAPA does move a lot of water, the value of water is never measured in its quantity alone. It is defined by participation in the actual growth of the biosphere and the economy. The contribution to the growth of the whole system is the only basis for developing a measure of economic value generally, emphatically including the productivity of any water in the North American hydrological cycle.

For example, since this is a continental system (as a subcomponent of the global hydrological system), a first-order analysis is based on comparing the continental input and output of freshwater (e.g., rainfall and river runoff), with the resulting amount of plant growth; and then cross-comparing the effects of new plant growth back on the water cycle. For the most accurate representation, the total values are converted into per-area terms, and the rising productivity for the continental system will be seen in the increasing ratio of photosynthetic activity relative to water input. This becomes a reciprocal process, as the development of more plant life (enabled by the water) will then drive an even greater increase in the rate of re-utilization of the water while it remains on land.

This reveals the secret beauty of NAWAPA. Currently, a huge density of precipitation falls along the coastal region of Alaska and British Columbia, which very quickly rushes back into the Pacific Ocean to become saltwater—losing any potential to participate in a growth factor (**Figure 2**). Another massive input of precious freshwater flows north into the Arctic Ocean through the Yukon and Mackenzie basins, featuring two of the longest and largest rivers of the continent (with the Yukon and Mackenzie rivers together matching the flow of the mighty Mississippi).[2]

This intense concentration of coastal precipitation is a peculiar consequence of the relationship between the geography of North America, and the Coriolis-driven wind patterns in the northern latitudes. The northern west-to-east wind pattern carries with it evaporation from the Pacific Ocean, an immense store of water vapor. However, instead of this moisture delivering its benefits across the land mass (as is done in the west-to-east delivery of Atlantic moisture across similar latitudes in Eurasia), this Pacific moisture hits the massive block of North America's western coastal mountain ranges, pushing the moist air to higher alti-

FIGURE 2




INEGI, NR-Can, USGS, North American Environmental Atlas of the Commission for Environmental Cooperation.

*Precipitation map of North America, with major river runoff overlaid. The thickness of the arrows roughly corresponds to the average amount of runoff.*

2. Also take note that Canada's Yukon and Northwest Territories provinces have populations of 34,000 and 41,500, and population densities of 0.07/km$^2$ and 0.04/km$^2$, respectively. Alaska appears to be an urban center in comparison, with its population of 731,500 and population density of 0.49/km$^2$.

tudes where it condenses, much of it falling on the Pacific side of the mountains, running back into the ocean before it can get much work done. In fact, this is one of the least productive concentrations of rainfall of the entire planetary terrestrial water cycle!

Regarding the water in the North that makes it over the continental divide, to flow up into the Arctic, the biospheric productivity of this northern territory is not limited by any shortage of water, but by lack of sunlight and the resulting frigid cold. For example, the Mackenzie basin has a -10°C mean annual temperature, with widespread permafrost in the North (where the land transitions to tundra), and nutrient-poor forest soils in the south.[3]

Contrast this with the lower half of western North America. In the southwestern United States, where there is significant farming, agriculture, industry, population centers, and the potential for much, much more, the amount of freshwater runoff available is very small—only 91 million acre feet per year (MAFY/113 $km^3$), compared with the 1,220 MAFY (1,494 $km^3$) of the northern basins.[4] In the Southwest, stretching from California to Texas, the climate is excellent, and the soils are fertile, but the limiting factor is the lack of water. This extends east, to the High Plains states, and south, into Mexico. Entire regions of agricultural land are being lost, towns are running dry, and finite groundwater stores are being depleted, threatening an imminent and deadly food and water crisis.

Taken together, this North-South disparity in the West lowers the productivity of the water cycle of the entire continent.

NAWAPA was designed to take a small fraction of some of these northern rivers (about 10% of the total runoff, by taking ~20% of the runoff from a select set of rivers), and redirect the water south, both down into the Southwest and into Northern Mexico, and also southeast, into the drought-prone Canadian Prairie Provinces and to the Great Lakes (where the water level has been steadily falling since the late 1990s). As implicit in the original NAWAPA plan, this more equitable distribution of the continental water cycle will vastly improve the productivity of North America as a whole.

However, since the original designs were developed, the energy-flux density of available power has greatly increased, and with it, so has the potential for a level of improvement which would not have been possible otherwise (**Figure 3**).

Nuclear power can drive the pump-lift systems of NAWAPA, removing the need to waste precious water

FIGURE 3


INEGI, NR-Can, USGS, North American Environmental Atlas of the Commission for Environmental Cooperation.

*Average annual precipitation for the North American continent, with the NAWAPA XXI system (along with the proposed extensions) presented on top.*

3. See, "Ecological Regions of North America—Toward a Common Perspective."

4. Unless otherwise noted, the freshwater runoff figures in this article are from John D. Milliman and Katherine L. Farnsworth, *River Discharge to the Coastal Ocean: A Global Synthesis*, May 2013.

on hydropower, and thus increasing the water available for distribution throughout the system. This makes additional extensions more feasible: bringing water east, into the central region of the continent with the Great Plains Canal, feeding most of Nebraska, and the western regions of Kansas, Oklahoma, and Texas (where the Ogallala Aquifer is being overdrawn); to the water-starved regions of the Klamath River, the California Central Valley, and directly into the California water system with the California-Oregon extension; and options for coastal nuclear-powered desalination systems to create freshwater from seawater, or inland nuclear-powered desalination and purification systems to treat brackish or mineral-laden inland water.

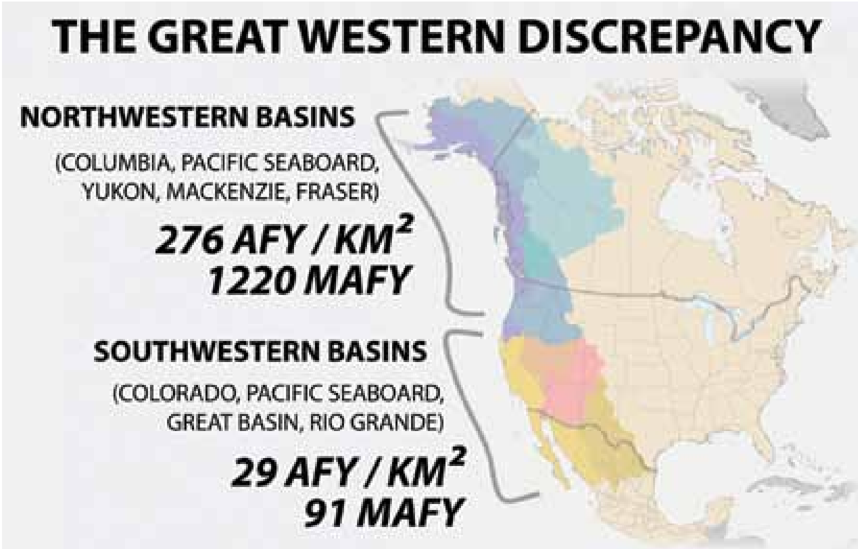
Another massive extension would be to transfer water from the southern coastal regions of Mexico, where there is significant freshwater runoff, and channel the water north along the Pacific and Atlantic coasts, linking to NAWAPA on both sides, the PLHINO/Northwest Hydraulic Plan (Pacific) and PLHIGON/Northern Gulf Hydraulic Plan (Atlantic) projects.[5]

Added to this, ionization-based weather modification systems can direct additional moisture and rainfall patterns to needed locations, further refining man's control of the continental water cycle.[6]

All this will be possible with a nuclear-thermonuclear NAWAPA XXI.

The key to the future survival of North America is the direct interrelationship among energy-flux density, plant life, and water re-utilization per cycle. It is time for man to improve the biosphere in a way only he can do.

FIGURE 4




*Division of the Northwestern water basins from the Southwestern. The total freshwater runoff for each set of basins is provided in million acre feet per year (MAFY), and the averaged acre feet per year (AFY) per square kilometer is provided as well. The total runoff values are what would leave each basin, assuming no withdrawals for other purposes; for example, the value used here for the Colorado is 16.2 MAFY, which corresponds to how much precipitation the basin receives, even through the actual amount that currently runs into the ocean is only 0.2 MAFY, since most of the river is used along the way for agricultural and economic activity.*

## The Great Western Discrepancy

This "Great Western Discrepancy" can be better quantified by examining the specific water basins involved on both sides.

For the North, the excessive rainfall and runoff is found in the Mackenzie, Yukon, Fraser, and Columbia River basins, plus the Pacific Seaboard, from Bristol Bay Alaska down to about the northern border of California (42°N latitude).

The southern division contains the remainder of the Pacific Seaboard down to the Tropic of Cancer (at just about the southern tip of Baja California Sur), and includes the Rio Grande and Colorado River basins, along with the landlocked Great Basin.

The connection to the U.S.-Canadian High Plains system, and additional water from Southern Mexico can then be considered as well, following the initial quantification of the Great Western Discrepancy (**Figure 4**).

The precipitation into these basins, and the freshwater runoff leaving them, provides the water input and output of the two areas. This is improved when the

5. See the discussion of the PLHINO and PLHIGON Mexican water projects in Dennis Small, "Make that Which Is Reasonable, Possible—U.S. and Mexico: Cooperate on Great Water Projects," *EIR*, Dec. 7, 2007.

6. See, Benjamin Deniston, "Expanding NAWAPA XXI: Weather Modification To Stop Starvation," *EIR*, Aug. 9, 2013.

values are considered in per square kilometer terms, by comparing runoff relative to the size of the basin catchment area—showing that the northwest runoff per area is an order of magnitude higher than the southwest. Comparing these with the value for the entire continent further illustrates the point, with the Northwest being about a factor of 2.5 times above the continental average, and the Southwest being about a factor of 3.5 times below the continental average, when considered in per square kilometer terms, as seen in **Table 1**.

TABLE 1

| | River Runoff (MAFY) | Area (Million KM²) | AFY/KM² |
|---|---|---|---|
| **Northwestern Basins** | 1220 | 4.42 | 276 |
| **Southwestern Basins** | 91 | 3.11 | 29 |
| **North America** | 2554 | 23.1 | 110 |

This provides the basis to investigate the physical (e.g., photosynthetic) productivity of the Western water cycle, and how this Western productivity (or lack thereof) affects that of the entire continent. Most importantly, this defines the physical framework for determining how the entire continental system can be improved by higher levels of energy-flux-density-driven water and biospheric management.

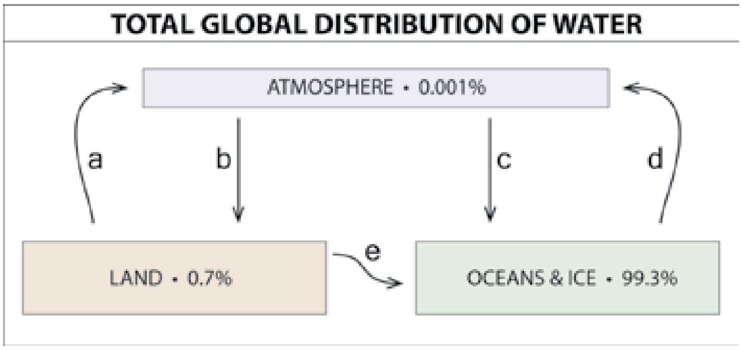
The general question is the following:

Within the average continental yearly freshwater input-output cycle (i.e., the net annual continental hydrological flux), how productive is the water?

Photosynthesis provides an initial productivity reference point, both because of the value of its action in the creation of biomass, and the multiplier effect that plant life has back on the water cycle.[7] What is the annual average photosynthetic activity per square kilometer for the Northwestern and Southwestern water basins identified above? What effect does water, or the lack thereof, have on this? Compare the Northwest and Southwest with photosynthetically productive areas, and with the entire continent.

NAWAPA XXI revolutionizes the productivity of the continental water system without needing to increase the net input of water into the continental system, while still revolutionizing the productivity of that same water. The secret lies in more than just the redirection, but in actualizing the multiplier factor provided by plant life itself. How many times can the water can be cycled through processes of use and reuse (e.g., photosynthesis or rainfall) per cycle from ocean to land and back to ocean?

FIGURE 5




*Distribution of the Earth's water measured by percentage, with the general flows from one system to another indicated.*

For this to be understood and measured, an estimation of the freshwater input into the continental system is required. Since there is a regular seasonal variation, the average annual input is needed. With this defined, it becomes possible to ask: What does the input actually accomplish, in physical terms? More importantly, what can mankind uniquely encourage it to do? And how can that be qualitatively improved with higher levels of energy-flux density?

## Input and the Multiplier Factor

The effects of plant life can be measured relative to this average annual input.

In the most simple terms, **Figure 5** illustrates the basic inputs and outputs of freshwater for the global hydrological cycle. For example, rainfall (***b***) provides a freshwater input, while rivers releasing freshwater into the ocean provide an output (***e***).

Distribution of the Earth's water is measured by percentage, with the general flows from one system to another indicated.

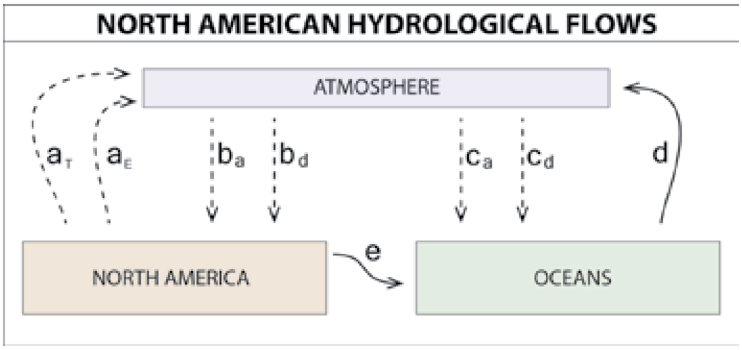
However, some of the atmospheric moisture which is the source of the precipitation on land (***b***) comes from evaporation of water that was already on the land, as indicated by ***a***.

7. One relatively standard measure of the amount of photosynthetic activity (i.e., how much new biomass is created) is called the "net primary productivity," which measures the mass of atmospheric carbon (from that wonderful non-pollutant that plants love, $CO_2$) that is incorporated into living biological matter through photosynthesis. This can be measured in tons of carbon incorporated into biological matter, per square kilometer, per year.

So, to properly define continental freshwater input requires quantifying the precipitation that did not come from the freshwater that was already on the body of the North American continent. Input defines only new freshwater that is introduced onto the continental system: evaporated ocean water that then falls as precipitation over the continent. Simply measuring precipitation without asking where the moisture came from would lead to double counting when strictly defining input.

By Figure 5, actual input is ***b*** (precipitation over the land) minus any contribution from ***a*** (atmospheric moisture coming from water evaporating from the land). Another way of defining this is the amount of ***d*** (water evaporated from the ocean) which falls in ***b*** (precipitation over the land). This is indicated in **Figure 6**, an illustration of the North American water cycle, as $\boldsymbol{b_d}$.

FIGURE 6




*Schematic of North American water cycle with precipitation subdivided by the source of the moisture (either form* ***a****, the continent, or* ***d****, the ocean); evaporation from land subdivided into general evaporation (****E****) and the transpiration of plants (****T****).*

This defines the general freshwater input for the continental hydrological cycle. The output would then be the sum total of freshwater runoff (***e***) plus the rainfall that comes from evaporated continental water which then falls over the ocean ($\boldsymbol{c_a}$).[8]

A team at Delft University of Technology, Netherlands, has provided some initial estimations of these values.[9] Using new methods for modeling the transfer of water between the atmosphere, oceans, and land, they were able to estimate, for specific areas, how much of the precipitation came from moisture which evaporated from the ocean versus that which evaporated from the land.

For example, they say that, on average for the entire globe, 40% of the precipitation over land originates from moisture that was already on the land. However, for different landmasses this percentage varies significantly (Figure 6).

For China, they estimate that about 80% of its rainfall comes from moisture evaporating from the Eurasian landmass. North America is the second-lowest for any continent, with only 30% of the precipitation coming from moisture which evaporated from the land.[10] This analysis of the different sources of precipitation defines the multiplier value of continental precipitation: For water that falls on a particular continent, how many times will it evaporate, and then rain back onto that continent again, before returning to the ocean? For North America the multiplier factor is about 1.45, while the global average is 1.67.

When discussing this lower multiplier factor for the North American continent, Hubert Savenije and his colleagues at Delft University repeatedly reference the role of the Western coastal mountain ranges in blocking moist air from moving inland. This arbitrarily lowers the cycling potential from the very start, by causing a large amount of precipitation to immediately return to the Pacific Ocean before it has a chance to evaporate, let alone participate in plant life. For the precipitation (input) that does remain on land long enough to re-enter the air, they note that 60% of the evaporation from the West returns to the continent again as rain. So while most water falling along the coast does not get a chance to evaporate, that which does has a multiplier factor of 1.67—higher than the continental average of 1.45. Again, the discrepancy is enhanced by the fact that so much northern water runs off so quickly, before any evaporation can take place to enable the general west-to-east transport of moisture.

Recall the specifics of the Great Western Discrepancy. In the northwestern basins, 1,220 MAF of water runs off every year, averaging 276 acre feet of yearly

8. There are additional complicating factors. For example, groundwater that otherwise would be stored below the surface is being extracted and released onto the surface, to then be evaporated, and become runoff. This, and other secondary factors (including new inputs from ocean water desalination), can be accounted for within the overall framework being defined here.

9. See, Rudi van der Ent, Hubert Savenije, et al., "Origin and fate of atmospheric moisture over continents," *Water Resources Research,* September 2010.

10. Australia has the lowest percentage for any continent, with 20%.

runoff per square kilometer (as compared with the continental average of 110). When considering its scant participation in plant life, and the limited evaporation for inland transport, *this is among the least productive concentrations of precipitation globally!*

NAWAPA's redirection of the water into the High Plains and Southwest would automatically increase the multiplier effect of the continental water input, without needing to change the input itself. Since water that evaporates from the West averages a 1.67 multiplier factor, NAWAPA's delivery of freshwater throughout the Canadian prairie provinces, the 17 Western U.S. states, and Northern Mexico, will ensure that more of this northwestern water will get a chance to re-enter the atmosphere, increasing the rainfall throughout the Western and Central regions.

*However, the real power of NAWAPA does not rely simply on evaporation alone, but rather, on the additional boost factor supplied by densities of new plant life supported by this water.*

Among the proposals for future refinements given in the Delft University report, is including the role of plant life in the cycling of water across continental landmasses.

While the Delft group has not done an analysis of the effects created by all the plant life on a global scale, one follow-on study did examine a few specific regions which are highly dependent upon land evaporation for their rainfall, such as China. They studied the effects on rain patterns created by changes in the neighboring land from which the moisture originates. For example, irrigation and water management systems in India, they conclude, have led to an increase in rainfall for China.[11]

This becomes a recent addition to a long history of studies examining the effects of plant life on the hydrological cycle.

## The Great NAWAPA Forests

While plants use some water directly for photosynthesis, using the water's hydrogen in the generation of biomass, and releasing the oxygen into the atmosphere, they also release much more water vapor directly into the atmosphere. This plant transpiration can significantly increase the moisture delivered to the atmosphere; the introduction of large amounts of new vegetation can directly affect the water cycle, weather, and even climate.

While all plants reintroduce moisture back into the atmosphere, trees and forests are the most effective in this process. For example, a 70-foot-tall sycamore tree can bring 100 gallons of water per hour from its roots to its leaves, 90% of which transpires into the atmosphere. This takes water from the subsurface water table—which would not otherwise evaporate, but would instead follow the underground water table toward streams and rivers to eventually run off—and lifts it into the atmosphere.

Within forests, certain angiosperms, such as oaks, throughput water at a much faster rate then their less biologically advanced cousins, the conifers, e.g., pine trees (although it should be noted that the oaks are much slower growing than the pines).

A 2012 review of decades of studies on the effects of plant life and forestation on the water cycle notes that, in general, forests release 1.4 to 1.75 times more water per square kilometer into the atmosphere than grass or croplands. Authors David Ellison, Martyn Futter, and Kevin Bishop[12] note that plant life plays a critical role in strengthening the inland transport of water, and promoting precipitation on local and regional scales.

While NAWAPA will provide desperately needed water for existing agricultural, municipal, and industrial needs, for the multiplier power of plant life to be fully realized, the water must also go toward significant greening of strategic regions.

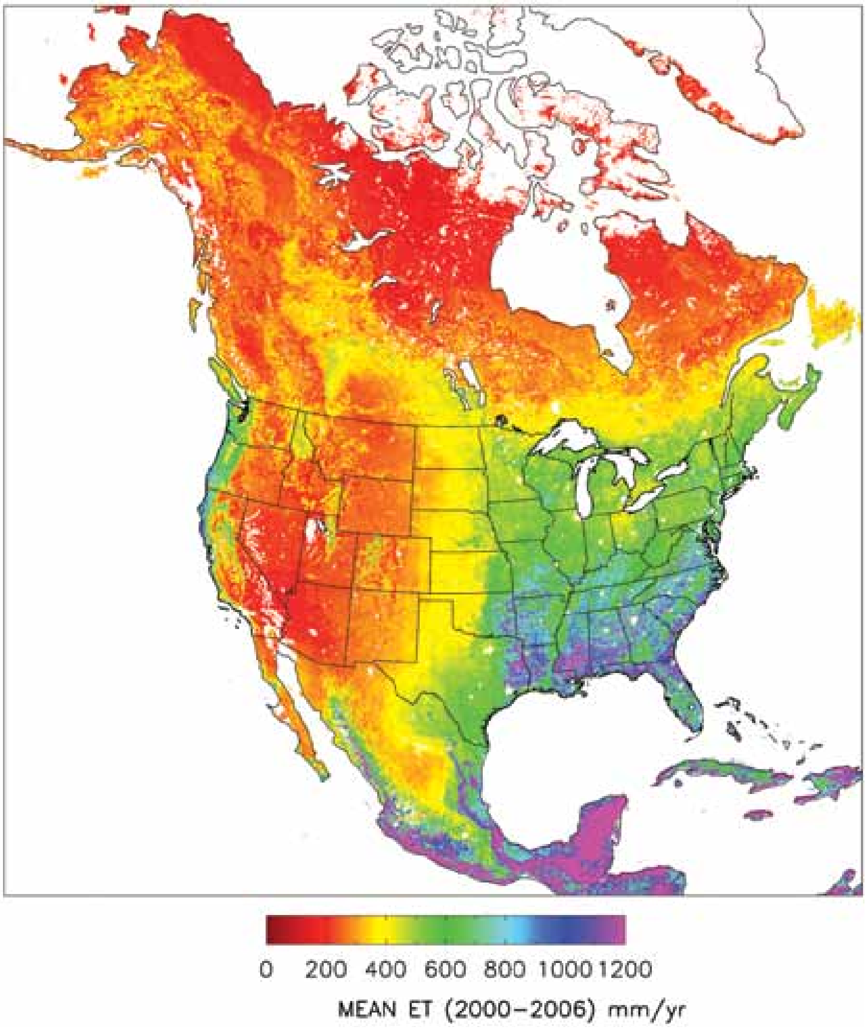
As discussed above, the atmospheric-hydrological system of North America has an overall west-to-east directionality, a characteristic that can be utilized to increase the multiplier factor provided by plant life. For example, consider using NAWAPA water to create dense strips of forest running north-south along the main NAWAPA distribution trunks running from Idaho, through Utah, and into Arizona and Mexico, as well as the western branch from Utah, through Nevada, and along the California-Arizona border. A third north-south strip could follow the Colorado aqueduct, and/or the High Plains extension.

Such forests could rapidly accelerate the return of water into the air, as moisture for more rainfall. Addi-

11. They also identify locations where deforestation in one region lowers the rainfall in another region. See, P.W. Keys, R.J. van der Ent, et al., "Analyzing precipitation sheds to understand the vulnerability of rainfall dependent regions," *Biogeosciences*, February 2012.

12. See, David Ellison, Martyn Futter, and Kevin Bishop, "On the forest cover-water yield debate: from demand to supply-side thinking," *Global Change Biology,* 2012.

FIGURE 7




*Yearly photosynthesis as measured by evapotranspiration. Information provided by the Moderate-resolution Imaging Spectroradiometer (MODIS) instrument on board the Terra and Aqua Earth-observing satellites.*

For the purposes of measuring the exact freshwater input, these layers of multiplier factors add a bit of a difficulty ($\boldsymbol{b_a}$ vs. total $\boldsymbol{b}$) (Figure 6), but when examining productivity, this re-utilization provides the key productivity multiplier factor which man can utilize for the future survival and progress of the continent. Whereas abstracted absolute quantities mean very little, value is found in the spacial and temporal density of productive re-utilization per cycle. A hydrological flux density measured over a continental territory.

## Productivity

Photosynthesis provides the biological raw material for the entire biosphere, upgrading atmospheric carbon and water-derived hydrogen and oxygen into direct participation as living biological matter.

Since some of NASA's Earth-observing satellites have the ability to measure processes related to this activity, they can provide an image of the average global distribution and density of photosynthetic activity (**Figure 7**).

These measurements provide a first-order approximation of the productivity of the continental water cycle.

As stated above, the basic productivity function is measured by "photosynthetic activity/net continental hydrological flux." In terms of the values and measurements discussed above this can be measured by:

$$\frac{\text{photosynthetic production (NPP)}^{14}}{\text{freshwater input } (\boldsymbol{b_d})}$$

This should then be measured for the entire conti-

tional elements can be considered, including ionization-based weather modification systems, designed to induce existing atmospheric moisture (provided by the trees) to condense and fall as rain.[13]

Taken together, NAWAPA XXI can provide the means to tap into the multiplier power of plant life, enabling an intensive and extremely productive recycling of the freshwater input, which would otherwise be wasted, into the continent.

13. Or even perhaps modulating the systems to keep existing moisture from raining down where it is not desired. Op. cit., Deniston (footnote 6).

14. Net primary productivity, measuring the mass of atmospheric carbon incorporated into living biological matter through photosynthesis.

nent, and for the identified sub-territories.

Only then can the actual physical productivity of the "natural" continental water cycle be seriously measured. Against this, the effects of NAWAPA, a nuclear-thermonuclear NAWAPA, and the multiplier effects of dense plant life and forests can be measured. Redistributing existing water runoff into the Southwest will increase the photosynthetic activity without changing the continental input, increasing the productivity of not only the West, but the entire continent.

Referring back to Figure 6, the following two ratios also must increase, both for the West, and the whole continent:

$$\frac{\text{precipitation from continental water } (\boldsymbol{b_a})}{\text{freshwater input } (\boldsymbol{b_d})}$$

and,

$$\frac{\text{transpiration } (\boldsymbol{a_T})}{\text{total evaporation } (\boldsymbol{a_E})}$$

This is only the first consideration in defining the boundary parameters of growth requirements of the system as a whole. Within this, specific qualities of biomass production can be investigated.

As just discussed above, since plant life is the real boost factor for the productivity of the continental hydrological system, the impact of different types and species of plants on the hydrological cycle must be considered.

A higher ratio of more advanced forest biomass relative to the total biomass will provide a greater increase in the multiplier factor ($\boldsymbol{b_a}/\boldsymbol{b_d}$).

Additional categories to be considered include the following:

- Biomass Consumable by Animals—for example, sugars, as opposed to lignin
- Biomass Consumable by Livestock—for cattle farming, for example
- Biomass Consumable by Humans—general agriculture
- Biomass Usable as Raw Materials—for example, wood, and cotton

In considering the productivity of the water cycle in greater detail, the ratios of each of these categories relative to total biomass can be measured. As above, each of these ratios is considered in per square kilometer terms, and for particular sub-territories dedicated to each of these categories.

Now return to the following consideration: What gives mankind the power to do this?

## The Nuclear-Thermonuclear Driver

The original NAWAPA design was a relatively limited prospect.

Although grand in thinking for its time, the available technology and power density was greatly limited, compared with what is available today. This resulted in an original NAWAPA design with an inherent 45% loss factor, in terms of water utilization. Water would have to be collected within the system, only to then be released into the ocean, to generate enough power to pump the rest of the water throughout the Southwest.

With a higher level of energy-flux density, NAWAPA jumps to an entirely new platform.

Key pump-lift stations in the northern regions raise the elevation of the water to allow it to flow by gravity throughout most of the rest of the system.

By the original design, the first lift, Taku, raises the water from 2,000 to 2,300 feet, the second, Fraser, from 2,300 to 3,000, and the third is a major operation, the Sawtooth Lifts, from 3,000 to 5,500 (**Figure 8**). With the California-Oregon extension, another major pump is required in Oregon (lifting the water an impressive 4,200 feet).

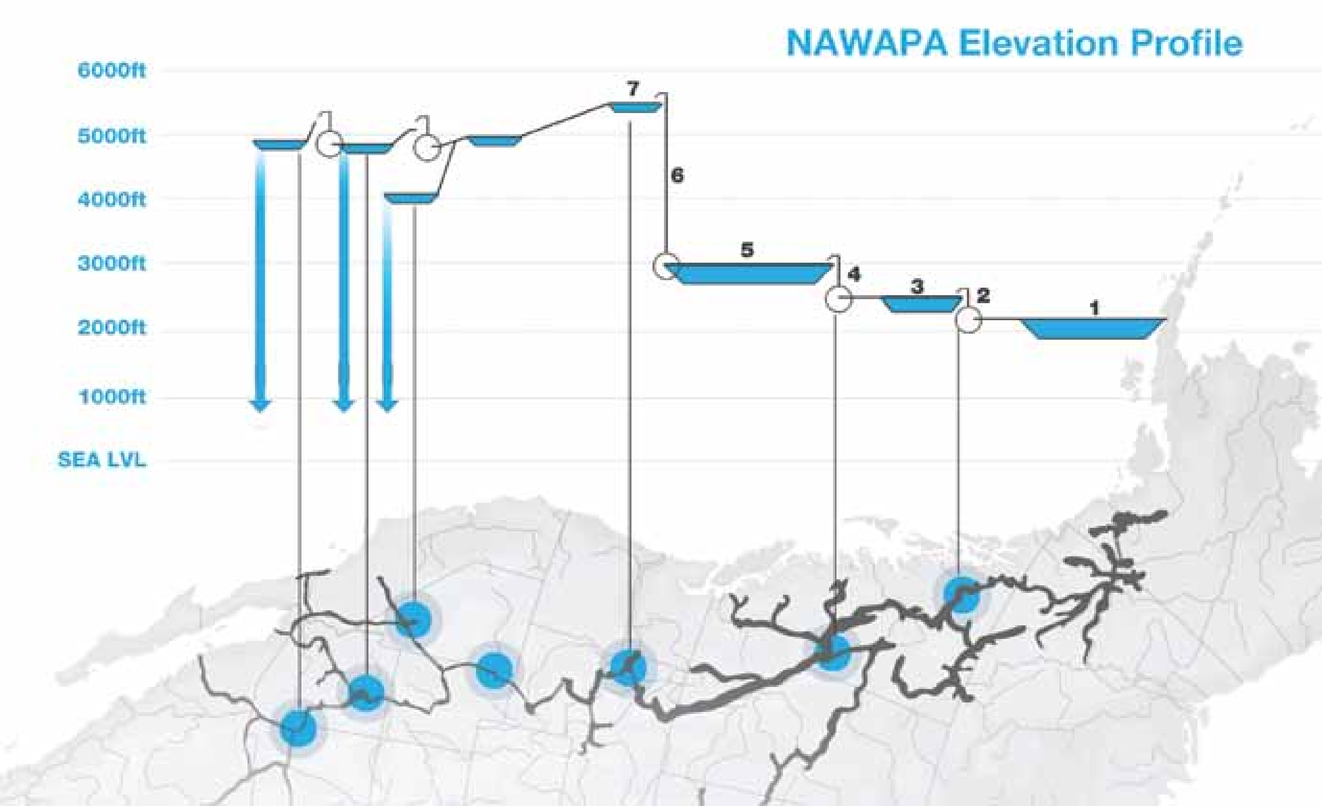
In total, for distribution into the Southwest,[15] the original NAWAPA design depended upon collecting around 130 MAFY, and then releasing around 60 MAFY of that collected freshwater into the ocean, solely to generate the power needed to pump the remaining 70 MAFY into the Southwest, a 45% loss factor.

With a series of nuclear power plants built for generating the power required for pumping, utilizing a higher level of energy-flux density solves this waste of precious water. The elimination of the unnecessary hydropower systems will also simplify certain components of the system, easing the construction requirements, and possibly shortening the timeframe.

This nuclear option provides new opportunities for the NAWAPA XXI system.

15. This does not include the distribution to the Canadian Prairies and the Great Lakes, since that is on the other side of the continental divide, and does not have the same pumping requirements.

FIGURE 8




*1) NAWAPA—Elevation Profile: 1) Copper Reservoir, Tanana-Yukon Reservoir, Taku Reservoir, Susitna Reservoir. 2) Taku Lift. 3) Liard River Reservoir, Nass Reservoir, Skeena Reservoir, Babine Reservoir. 4) Frasier Lifts. 5) Rocky Mountain Trench, Flathead Lake, Flathead Reservoir, Clearwater Reservoir. 6) Sawtooth Lifts. 7) Sawtooth Reservoir.*

In one option, the volume of water delivered could be the same as in the original design, pumping 70 MAFY to the Southwest and Mexico (plus the redirection of water from the Mackenzie basin to the Canadian Prairies and the Great Lakes), meaning less runoff water would need to be collected in the first place (since none would have to be collected only to then be released for hydropower).

In another, the same amount of water could be collected, and instead of releasing some for hydropower, more could be made available for distribution, potentially nearly doubling the water available for the Southwest and Northern Mexico. While the final analysis won't be quite that simple, this is the general effect of moving from hydropower to nuclear.[16] This would require increasing the capacity of the system, including the volume of water flowing through the pumping systems, requiring more power for the three major pump-lift systems of the North, which would just require adding more nuclear power to the system.

In addition to more water being available, critical extensions expand the distribution of water to other regions.

The High Plains extension provides water to the region of the Ogallala Aquifer, where the agriculture of western Texas, Oklahoma, and Kansas; most of Nebraska; and parts of New Mexico, Colorado, and Wyoming depends upon the overdrawn aquifer.

The California-Oregon (CA-OR) extension provides existing river and water systems in those states with much needed reinforcements, securing and strengthening the existing capabilities.

The pair of coastal water projects for Mexico, PLHINO and PLHIGON, can bring significant addi-

16. In the final analysis, it won't be quite as simple as doubling, since various extension would begin to tap this supply in additional ways, including bringing some further east, to bolster the supply to the Canadian Prairies and U.S. High Plains regions.

FIGURE 9


*Map of NAWAPA XXI with four extensions indicated. Three sets of river basins are also identified, the northwest basins (blue) involved in collection, the southwestern basins (red), and the High Plains basins (green).*

tional supplies of water from the southern regions north, hooking into the NAWAPA system as it enters Mexico (**Figure 9**).

Higher levels of energy-flux density enable what the original NAWAPA did not, allowing man to utilize the multiplier factor of plant life to an even greater extent. Nuclear-thermonuclear systems power the increased productivity and density of recycling of the entire continental water system, overcoming the arbitrary block of the coastal mountain ranges and bringing the biosphere to levels of activity impossible without man's intervention.

## Regaining a Grip on the Future

This is a global program.

Glass-Steagall, alone, has systemic global implications, overturning the Anglo-Dutch monetary dictatorship over the trans-Atlantic nations, and laying the basis for the creation of a Hamiltonian Federal credit system. Without this, none of these productive leaps are possible.

The basic NAWAPA water-distribution system directly involves Canada, the United States, and Mexico. The nations sharing the North American continental water cycle have the responsibility to manage it and improve it for the betterment of all involved. It must begin as soon as possible.

Especially when the central role of the nuclear-thermonuclear driver is considered, the international scope of the project immediately extends to China, South Korea, Japan, and Russia. Since the United States shifted to a post-industrial mode, the industrial and manufacturing capabilities have been disappearing, typified most emphatically by the 2006 commitment to eliminate the auto sector—the highest density of machine-tool and related potential the United States had. Now, since American lacks the ability to construct critical components for nuclear power plants, let alone in a mass-production mode, this will require international agreements with China, South Korea, Japan, and Russia, where some capabilities still exist.

NAWAPA also immediately opens up the general development of the Arctic regions, including the construction of a Bering Strait rail connection between Alaska and Russia, linking the entire North American and Eurasian landmasses with advanced high-speed rail systems.

Mankind's next economic platform relies upon the massive development of nuclear and thermonuclear systems and technologies. This includes the cheap and efficient generation of massive amounts of electrical power, but extends to revolutions in construction and earth-moving; industry and manufacturing; health and medical sciences; agriculture and biospheric development; and the most fundamental understanding of what a natural resource even is.

A nuclear-thermonuclear NAWAPA XXI, centered around an international Manhattan Project-style crash program for the development of thermonuclear fusion systems and technologies, lays the basis for the needed new economy. It starts with man improving the biosphere in a way only he can, empowered with higher levels of energy-flux density to actualize the multiplier factor of plant life at completely new rates of activity.

NAWAPA is a return to a policy of progressive leaps.