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Marvin Harris- "Theoretical Principles of Cultural Materialism"

Abstract by Jack G. Patterson

If anthropology is going to accumulate a body of scientific knowledge of culture, then Marvin Harris proposes that cultural materialism will provide the necessary theoretical approach via the etic method. Cultural materialism looks at the physical or material component of human existence as the prime determinant of sociocultural phenomena - similar to, but subsuming, Marxist principles. It also makes a distinction "between thought and behavior and emics and etics." The etic method is a strategy for interpreting cultural data by an "exterior" interpretation; it is objective and used to form models for testing. (The opposing emic method allows for an "interior" interpretation of data; the data that the anthropologist interprets is confirmed by the studied people.)

Harris places sociocultural phenomena into three behavioral sectors: infrastructure, structure, and superstructure. Infrastructure comprises of modes of production (technology of subsistence and environmental relationships) and reproduction (demography, mating patterns, fertility). Structure is the organization of the production and reproduction in a domestic economy (family, division of labor) and a political economy (class hierarchies, factions). Superstructure comprises of various phenomena such as art, rituals, and science. Infrastructure represents the interface or interaction between culture and nature. This interface determines the developments in structural phenomena, and then in superstructural ones, by the increase of productivity or amount of energy per capita as necessary in local systems. Structure and superstructure are systemic components that preserve the whole system. In matters of cultural change, infrastructural change is predicted to alter the other sectors, and compensatory changes are made by the structural and superstructural sectors, to themselves, to maintain the infrastructure.

Émile Durkheim- "Elementary Forms of the Religious Life"

Abstract by Ligia Diaz

The key point of Durkheim's article is that religion is inherently social. Studying the relationship between religion and society, Durkheim observes that encompassing all thought are categories of understanding (ideas of time, space, substances, etc). These categories are the schema of knowledge. He explains that both time and space are social. If time and space are socially constructed, then it is likely that all of the categories of understanding are socially constructed. Durkheim states there is no religion which is not simultaneously a representation of the way in which the world is seen in that society. Therefore, religion is a system of knowledge which is intrinsically social and it is in the process of learning religion that members of a society learn collective representations.

The categories of knowledge are collective representations. Knowledge cannot be a priori because different societies would not have different collective representations. Neither is knowledge assembled from individual experience because unanimity would not exist in a society. Rather, knowledge is *taught* within a society. Durkheim explains that societies have collective representations. That is, they have shared perceptions. These perceptions also vary from one society to another. Durkheim posits that in primitive societies those socially derived categories of understanding are embedded in religion. Therefore, religion is inherently social. This is not to say however that knowledge is lack objective value simply because of their social origins. Durkheim asserts that their social origin suggests roots in the nature of things.

A.R. Radcliffe-Brown- “On Social Structure”

Abstract by Ligia Diaz

Radcliffe-Brown’s article suggests that social anthropology should be regarded as a branch of natural science. That is, social anthropology should use methods which are fundamentally similar to those used in the physical and biological sciences in order to discover the laws of society. Just as biology studies the morphology, physiology and changes through time of organisms, social anthropology must look at social morphology (classifications of different kinds of forms), social physiology (how things of a society are integrated) and social change (how societies change over time). Radcliffe-Brown asserts that social anthropology is *not* the study of culture. He maintains that culture is an abstraction and can never directly be observed. Social structures, however, can be directly observed. Social structure is made up of all social relations on a person-to-person basis as well as the differentiation of individuals and classes by their social role. Social anthropology is the study of structural forms—their variations among, at a given time and through time. These social structures continue to exist even when membership changes. As in natural science, the key to studying social structures is that one must look at events which occur frequently. That is, social anthropology may study relations between specific individuals in a society, but must be concerned with the general.

Radcliffe-Brown explains that social anthropology as a natural science requires fieldwork in order to generate concrete data on structural systems of particular societies. This data can then be used for comparative analysis. Social anthropology as a natural science can be applied to such areas as language, economy, law and magic and witchcraft.

Turkmenistan and Globalization: A Drop of Water is a Grain of Gold

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The word *globalization* is thrown around so often today that you just assume everybody knows what it is—until you ask them. An extremely simplified definition is that globalization is the global process of exchange. Easy enough; but stop and consider the meaning of each word and your understanding of them becomes a little more complicated. For the purposes of this discussion, I will define them thus: global—encompassing the entire biosphere including all peoples, localities, and ideas; process—the means through which exchange occurs; exchange—the interchange and networking of everything from commerce and culture to changes in sea levels and the atmosphere that exist between two or more parties. One resource most heavily affected by globalization is water, the most basic and critical of human needs. Water is prominent among the so-called "drama of the commons", which describes the conflict arising from the unequal distribution of or access to common global resources such as land, water, and air, which often results in serious problems within and among countries. The premier example of the former is the horrible mismanagement of water in Turkmenistan, which has resulted in grave economic, environmental, and health problems that continue to grow in severity, effecting increasing numbers of people in the region, even to this day.

While the West sits fat, arrogant, and blissfully ignorant of the realities and severities of many global problems, the so-called undeveloped countries are used up and squeezed dry while trying desperately to hurtle themselves into the world economy and a chance at survival. Such is the case with Turkmenistan, a fairly large country on the Caspian Sea between Iran and Uzbekistan. Turkmenistan's case mirrors that of many developing nations around the world: vast unemployment, most of the population in poverty, limited access to basic human needs, such as clean water and food, and the destruction of ancient and long-standing ecosystems on which local populations have depended for generations. Having suffered irreparable economic and ecologic damage under poorly-planned Soviet attempts at creating a cash crop, Turkmenistan

today is still a recovering newly-independent nation without the finances or technology to alleviate the problems affecting its people. Although the government has begun to make legislative changes, and a handful of international groups have stepped forward with aid, the future for Turkmenistan remains uncertain as long as its disastrous water situation is not seriously addressed by the larger global community.

To understand Turkmenistan's place on the world stage, we must first understand more about the country itself. About the same size as California, and coincidentally even within the same latitudes, Turkmenistan has a subtropical desert climate with the geography dominated by the vast Karakum Desert. The country is administratively divided into 5 provinces, called *velayats* (Figure 1): Balkan Velayat is on the Caspian Sea in the west; Dashoguz Velayat is in the Aral Sea delta in the north; Akhal Velayat is in the central and southwest desert where the capitol, Ashgabat, and the Kopetdag Range are located; Mary Velayat is in the central and southeast desert; Lebap Velayat is located along the eastern border and is the only velayat that includes the main water resource, the Amu Darya River (Curtis 1996).

Figure 1: Detailed map of Turkmenistan showing the borders of the five velayats, and natural water flows available to each.

The predominantly Muslim country of 6.7 million is mostly Turkmen, with large Russian and Uzbek minorities, as well as smaller various other groups of Central Asian descent, and a small Christian Orthodox minority (Curtis 1996). The average life expectancy, having recently dropped ten years due to the poor health conditions, is only 62 with a 1.4% population growth rate. About 60% of the population is unemployed, and an estimated 58% live below the poverty line (Curtis 1996). Pastoral nomadism, which had dominated Turkmen life for thousands of years, ceased to be an economic alternative in Russian-controlled Turkmenistan, and by the late 1930s the majority of Turkmen had become sedentary farmers and wage workers (Curtis 1996). Though once an isolated nomadic people, the Turkmen have, through Soviet collectivization, made progress in the area of exports. In 2006 its gross domestic product, or GDP, was $15.18 billion ($5,800 per capita) with the main exports being natural gas, oil and petroleum products, cotton, and textiles (CIA World Factbook 2007).

Despite the fact that agriculture comprises almost half the GDP and employs over two-fifths of the population, the main crop, and the most important source of income for most farmers, is cotton, leaving the country to import the majority of its foodstuffs; however, in an effort to

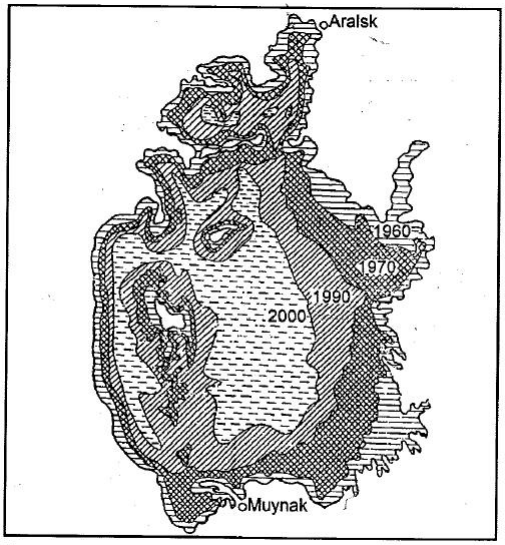

Fig. 21.1. Zones of drainage of the Aral Sea (1960 - 1970 - 1990 - 2000)

Figure 2: Chronology of the Aral Sea dry-out from the start of the process to the results in the year 2000.

decrease their dependence on foreign imports, new subtropical fruits and nuts have been introduced with some success, notably their high-quality melons (Curtis 1996). Yet cotton is king and since independence in 1991 Turkmenistan has more than doubled its exports of cotton to countries outside the Commonwealth of Independent States (CIS), and is today the largest producer of cotton per capita in the world (Curtis 1996). In fact, Western Europe now imports over 70% of its cotton from CIS countries, locally known as the Central Asian cotton belt (Curtis 1996). Turkmenistan's government is a combination of the old Soviet authoritarian style, and newly-permitted civil and Islamic law systems that were not allowed during the atheist Soviet era. But the old-style Soviet authoritarian system, having dominated the country for the past century, is slow and hesitant to change in a fast-paced globalized world, and for all its progress remains much the same as it was before independence. With an authoritarian ex-Communist regime in power and a tribally-based social structure, Turkmenistan has taken a cautious approach to economic reform, convinced that cotton is the most marketable product, and hoping to use gas and cotton sales to sustain its inefficient economy, despite the fact that natural gas extraction and delivery projects are drastically underfunded, underdeveloped, and too inefficient at this point to provide the revenues they seek (CIA World Factbook 2007). Privatization and marketization, both important components of economic reform as outlined by the government, are minimal, allowing for some privatization of agriculture and the establishment of seven free economic zones (Curtis 1996). Beginning in May 1993, the state began leasing land on the condition that 35 percent of the state procurement for cotton is provided as rent payment, with no additional monetary compensation for the farmer (Curtis 1996). It thus becomes easier to see why cotton is such an indispensable asset for Turkmen farmers; it provides them with a workable livelihood to replace their former nomadic subsistence, gives them a toehold to compete in the world market, and can even serve as a resource through which they can obtain privatized land.

Figure 3: Water coverage of the Aral Sea today. The red outline depicts the shoreline of 1957.

Keeping close to a Soviet style of government has also meant keeping in the style of grandiose engineering plans followed by devastating ill maintenance and poor management, most infamously

in the disaster of the Aral Sea crisis, perhaps the most outrageous example of water mismanagement in our history. To demonstrate the lack of foresight that led to the catastrophe, I found that back in the 1950s, Turkmenistan was included in the USSR's so-called policy of "cotton independence" in Central Asia, during which vast tracts of land were cultivated for growing cotton—possibly the most high maintenance crop you could choose with regards to water intake and irrigation—and extensive networks of irrigation canals were dug, diverting the natural river flows that replenished the Aral Sea (Orlovsky, Orlovsky 2003). Once the world's fourth-largest freshwater lake, the Aral Sea has dwindled to less than half its original area and volume, according to an abstract on global water shortages by Mary H. Cooper of *The CQ Researcher* in 1995. Figure 2 shows the chronology of the Aral Sea dry-out, while Figure 3 gives an actual satellite image. Cooper goes on to explain that what little water reaches the Aral Sea today is polluted with concentrated salts, chemicals, and pesticides from irresponsible and minimally-regulated dumping by upstream industrial and agricultural enterprises. Although there is a large system of irrigation canals, including the Karakum Canal at 1100km (640 miles) long, making it the largest irrigation and water supply canal in the world, they are old and deteriorating, poorly maintained, and highly polluted and salinized (The State of Environment of Turkmenistan 1999). Due to the lack of the financial resources and the elimination of the state-run structures formerly responsible for their maintenance, rural pipelines are becoming increasingly unfit for use and fail to operate properly (Orlovsky, Orlovsky 2003). Because none of the canals are actually water-sealed—indeed most, including the Karakum Canal, are literally no more than channels dug into the desert floor—seepage, evaporation, and contamination from sewage, drainage, and wastewater contribute to the deteriorating water quantity and quality (Orlovsky, Orlovsky 2003). Figures 4 and 5 show exactly how exposed the Karakum Canal is to the risks of contamination from the elements and

Figure 4: The Karakum Canal is highly vulnerable to contamination.

Figure 5: Camping by the exposed Karakum Canal.

Figure 6: Stranded fishing vessels in the dried-out Aral Sea seabed.

people alike. Consequently, 50-60% of the water in the canals is lost before it can even be used, and the efficiency rate of the irrigation system does not exceed 6% (Orlovsky, Orlovsky 2003).

This has many implications for the population. The rural inhabitants have to take water from open water bodies that, in the hot and dry climate, already contain high levels of microbiological contamination, and are neither properly treated nor disinfected (WHO National Environmental Health Action Plan 2002). The Dashoguz Velayat in the Aral Sea delta is of most concern due to its severe lack of potable water and the problems that it causes, as well as its location at the end of the line for aquatic pollutants resulting from the process of desertification in the region. The area's economy, once based on fishing, has collapsed with the demise of the lake's fish stocks, while local inhabitants are plagued with diseases resulting from poor sanitation and exposure to pollutants (Cooper 1995). Today you could literally walk the dried and exposed seabed of the Aral of 1970 and see the rusted and decaying remnants of once-productive local fishing vessels (Figure 6).

Another example of Soviet mismanagement can be seen in the situation with the Amu Darya, the longest river in Central Asia, which provides 90% of the country's water needs, of which a whopping 90% goes to irrigation (The State of Environment of Turkmenistan 1999). This is significant in pointing to not only the disrepair of the irrigation systems, but to governmental irresponsibility—in comparison the USA uses only 50% of its water reserves for irrigation and produces many times the output per hectare, not taking into account America's use of botanical genetic enhancement in crops like corn (Orlovsky, Orlovsky 2003). Table 1 shows the distribution of freshwater consumption, illustrating the consistence in consumption: 90% by irrigation, only 1-2% by domestic uses. In other words, water quality, quantity, and sustainability in Turkmenistan have been severely degraded in past decades more because of the irrational use of water resources than actual water shortages. In fact, Uzbekistan and Turkmenistan, both near-desert cotton monocultures, are the two biggest consumers of water per capita in the world, obviously due to their inefficient irrigation systems since very little of this water actually reaches its destination (Krastev 2006). The only rescue from highly contaminated groundwater, and indeed the only source of water for many people, is the Amu Darya River; but, Turkmenistan lies on the last leg of a very long river that is shared by three other countries, and once the Amu Darya gets there, it is already heavily salinized and polluted. Extensive methods of agricultural production in the region have led to an

Freshwater Consumption, billion m³

	1995	1996	1997	1998
Irrigation and agricultural supply	18,9	17,4	16,4	16,5
Industrial purposes (excluding agriculture)	1,5	1,4	1,5	1,3
Household and drinking purposes	0,3	0,3	0,3	0,4
Total	20,7	19,1	18,2	18,2

The Ministry of Nature Protection of Turkmenistan; 2003

Table 1: Freshwater consumption distribution from 1995-1998.

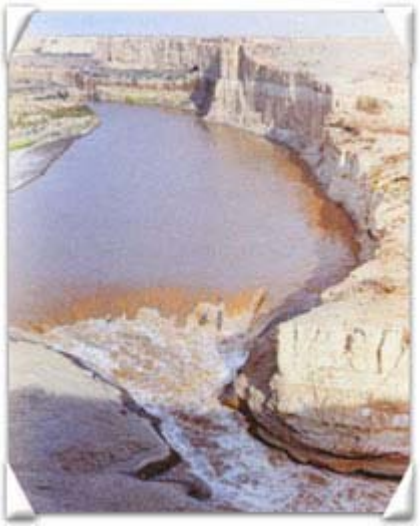

Figure 7: Wastewater, often the only water available in rural areas.

excessive application of pesticides, herbicides, and mineral fertilizers, of which a significant portion is swept away by surface water into rivers, irrigation channels, and water reservoirs (Orlovsky, Orlovsky 2003). At present, none of the treatment plants in Turkmenistan achieve the required safety parameters and most of them discharge wastewater into desert depressions practically untreated (The State of Environment of Turkmenistan 1999). Merely 49.6% of the total population has access to centralized water-supply systems, including 86% and 14% of the urban and rural populations, respectively (Orlovsky, Orlovsky 2003). Figure 7 shows an example of a wastewater channel that the rural population has no alternative but to drink from in many cases.

As a consequence of the rural population having insufficient access to the centralized water-supply system on the one hand, and the decline of the main water-supply facilities and water pipeline networks available for the urban population on the other, the water problem is a substantially dangerous cause of death and disease among the entire populace. A sharp decrease of both the quality and quantity of agricultural products produced in many of the velayats, massive importation of food products, often under-quality ones, from other countries, street trading (without license) of food-stuffs at unapproved retail outlets, and violation of food product transportation, storage, and trading laws, have all contributed to additional health risks associated with a higher rate of disease among the population (Curtis 1996). Consequently, you can observe a downward trend in such areas as life expectancy, birth rate, and an increase in infant mortality, and overall respiratory morbidity, in addition to higher incidence of cancer, communicable and parasitic diseases, and tuberculosis (Curtis 1996). The ultimate result has been to increase Turkmenistan's foothold in the world's cotton market at the expense of its natural resources, the Aral Sea, and the general health of its population.

I shall pause here to consider some factors that have led Turkmenistan and the surrounding region to this current state of crisis. First to remember is that the entire Central Asian region was part of the USSR, and as such the countries there are handicapped from the Soviet legacy of poverty and antiquated technology. Having achieved independence with the fall of the Soviet Union, countries in the region suddenly faced the same fundamental dilemmas as all ex-colonial states: who gets to make the decisions, and how will we support ourselves? Although Turkmenistan fortunately did not suffer the civil wars for control that often break out in such situations, it nevertheless has done very little to change or at least update the infrastructure that would result in major differences for the environment and the people. Second to consider is the paradox of the region's cultural and geographic isolation with relation to its efforts at participating in globalization. That is to say, each country has moved from being a small fish in a small lake, to a small fish in the open ocean; no longer under the relative economic umbrella of the Soviet Union, they hurtle unprepared into the unforgiving global free market system. Faced with the pressures of the global market, the countries, as common in undeveloped states, back virtually all their hopes on one or two economic options, and set about to take maximum advantage of their natural resources in order to meet their goals, much to the long-term detriment of their environment and inhabitants. This may seem foolhardy and retroactive, but to look at it from their point of view, it is hard to think about the future when you are starving today; people do what they feel they must to survive. Thus Turkmenistan and its neighbors represent a perfect example of how the pressures of globalization work to cripple an already weakened nation.

Domestic policies to address the water and sanitation crises have been historically mismanaged, poorly planned, and under funded. Because water, like natural gas and electricity, is free to all citizens of Turkmenistan, there is little incentive for conservation (Eurasianet 2004). But in

Sources: Ruben Mnatsakian, *L'Héritage écologique du communisme dans les républiques de l'ex-URSS*, Frison-Roche, Paris, 1994. *Atlas of the USSR* (in Russian), Moscow 1985.

Figure 8: Problems of Central Asia. Note that the entire region is affected by desertification.

recent years, "the concern about improvement of the environmental situation, creation of more favorable environmental terms, conditions for life and labor of people, has become one of the major targets of the world community as well as of each separate country," says P. Kurbanov, Ph. D., Minister of Nature Protection of Turkmenistan (The State of Environment Turkmenistan2003). As we discussed earlier, the area for greatest concern in Turkmenistan is Dashoguz Velayat, where the shortage of water resources is aggravated by the desertification of the region, and the high water intake for irrigation; this velayat is a big producer of wheat, rice,

cotton, and vegetables. You can see in Figure 8 the distribution of current problems in Central Asia, specifically in the areas of desertification, salinization, and contaminated water. The environment in this area is exposed to extensive portions of what used to be the Aral Sea that are now occupied by vast amounts of saline particles that get spread by the winds to the air and cause acute respiratory illnesses, especially among children (Orlovsky, Orlovsky 2003). The Amu Darya is the only source of water in this velayat, and we have already seen it is unhealthful and inadequate. Turkmenistan simply does not have the capacity to address its problems on its own, and yet the crisis of the Aral Sea dry-out has received little attention from the rest of the globalized world. If the processes of desertification and virtually no regulation on pollution are allowed to continue, the number of those at risk will only increase, and it will eventually come to affect the larger global community in the form of widespread diseases and loss of environment and natural resources.

A handful of international aid groups have stepped forward to begin the healing process, and bring these serious problems to the world stage. UNICEF has been the biggest supplier of aid and education in Turkmenistan and the Dashoguz Velayat in particular. UNICEF's new five year country-wide program in Turkmenistan (2005-2009) focuses on the rural areas because that is where most children live, and it seeks to develop partnerships with the government and offers a package of services tailored to each of the five velayats (UNICEF 2007). Until 2000, families in Gurbansoltan Edje district in Dashoguz Velayat had no choice but to drink saline, often bitter-tasting unsafe water that served as a major cause of diarrhea and other waterborne diseases among children (UNICEF 2007). But since UNICEF established the desalinization plant there in 2000, people have had better access to safe drinking water. Gochmuhammet Amanov, Director of the Desalinization Plant, explains that “the plant filters and chlorinates about 30-40 tons of water daily and that is enough for Gurbansoltan Edje district with a population of more than 20,000” (UNICEF 2007). There have even been upgrades made to the existing plant to improve its capacity to reach a greater number of people, helping provide the neighboring communities with a share of the potable water, as Director Amanov explains: “this year UNICEF has upgraded our plant and now the capacity has tripled….This will allow us to serve the drinking water needs and, thus, contribute to the improvement of health condition of thousands of people in our district as well inhabitants of neighbouring districts” (UNICEF 2007). Provisioning safe water supply and sanitary facilities, particularly in schools, and promoting hygiene education in basic schools, health facilities, and at the community level, are the main focus of UNICEF’s Water and Sanitation program in Turkmenistan (UNICEF 2007).

In the sweaty summer season, requirements for safe drinking water increase radically. Citizens of Gurbansoltan Edje district and a few neighbouring communities have the advantage of using the safe desalinized water, but many more in the region still suffer from inadequate safe water provisions; the next available desalinization plant is 80 miles away from Gurbansoltan Edje district, making it difficult for many families to have access to safe drinking water (UNICEF 2007). The representatives of the Drinking Water Association of other districts voiced their concern: “we wish people in our districts also had an access to safe water….Establishment of desalinization plants in our districts could dramatically improve the health of our people and we wish UNICEF to come forward to help us as well” (UNICEF 2007). Although there is no doubt UNICEF does good work, they are extremely restricted by their limited resources and, as we have seen, cannot and should not be depended upon for a final solution to the water problem.

The World Bank also stepped in to provide assistance in the form of a $30 million loan for the 6-year Turkmenistan Water Supply and Sanitation Project from 1998 to 2004 (The World Bank 2004). The project was part of the Aral Sea Program designed to address the environmental impacts of the Aral Sea disaster. It was specifically intended to improve the health of the population in the region most affected by the disaster, by investing in the water and sanitation infrastructure. The project targeted under-served areas with particular attention to secondary cities and the rural population. But the scope of the project was too wide for a first operation in a country where capacity and knowledge of Bank procedures was low, and major obstacles to the success of the project, including insufficient government commitment to the reform process, ultimately led to its failure to result in any significant improvements in the quantity, quality, or reliability of the water supply and sanitation services in the project areas (The World Bank 2004).

The National Environmental Health Action Plan for Turkmenistan from the World Health Organization, in 2002, identified six steps of action that should be taken to alleviate the water emergency in the country: (1) the development and adoption of national regulations on water resources, water use and drinking-water based on international requirements and local conditions, (2) the creation of an integrated drinking-water quality monitoring system according to the international standards, including "database" development to accurately monitor contamination levels, (3) the step-by-step construction and reconstruction of the drinking water-supply systems together with the necessary water treatment stages, including those for the rural population, (4) the establishment of control over the radiation safety of subterranean and surface water, (5) the treatment (neutralization) of sewage and economic and domestic wastewater so that it meets standard requirements, thus excluding any possibility of polluting soil, ground water and open water bodies, and (6) the compliance with the resolution adopted by the President on producing enough disinfectants for drinking water disinfection. According to the National Environmental Health Action Plan outlined by the World Health Organization, "there is good reason to believe that once up-to-date technologies are implemented, the amount of water contained in the water networks over Dashoguz Velayat can be used both for domestic uses and for upgrading to primary drinking water" (2002).

Although small steps are being taken to address the problems in Turkmenistan, it may be too little too late. Turkmenistan has been remaking and developing itself since its independence from Russia in 1991, but it is still bogged down by its Soviet legacy in its government and infrastructure. While international groups such as UNICEF can offer aid, their resources are limited and will not solve the underlying problems. Resistance to change and lack of motivation plague the country's prospects. Success in Turkmenistan lies in two areas: the willingness of the international community to take the water problem seriously, and the commitment of the Turkmenistani government to follow through on reforms. Turkmenistan presents an example of an ex-colonial state that has little choice but to use whatever infrastructure left intact by the retreating colonizer to make its own way into the international arena. But once having entered the world stage, it is impossible to return to a previous way of life; Turkmenistan cannot survive without its cotton industry even though it greatly contributes to the country's water shortage and environmental problems. This is a typical situation for a developing country in the era of globalization: you're damned if you do, and damned if you don't. Globalization can force

underdeveloped countries to thrust themselves into the world market unprepared, and yet seems agonizingly slow when it comes to providing relief to those same countries. After all, the concerns of the periphery are rarely significant to the core, until it is affected by the same problems. But ignoring the problem invariably only serves to make it worse.

Characteristic of desert peoples, an old Turkmen proverb says “a drop of water is a grain of gold.” If this simple yet pointed axiom is taken more to heart by both the Turkmenistani government and the international community, then steps can be made that will start this developing country on the road towards economic and ecologic growth and healing. Globalization doesn’t have to only apply to the market; we have the power to be proactive in our process of global exchange and to choose the exchange of knowledge and support over that of dollars and cents. It sounds crazy, I know, but the greatest ideas always do.

Works Cited

Cooper, Mary H.
1995 Abstract: Global Water Shortages. The CQ Researcher 5(47). Electronic Document, http://library.cqpress.com/cqresearcher/ppv.php?id=cqresrre1998080700, accessed September 21, 2007

Curtis, Glenn E., ed.
1996 Turkmenistan: A Country Study. Washington: GPO for the Library of Congress

EurasiaNet
2004 Desert Gold: Niyazov's Conflicted Approach to Turkmenistan's Water Woes. Electronic Document, http://www.eurasianet.org/departments/environment/articles/eav041604.shtml, accessed September 21, 2007

Krastev, Nikola
2006 The UN Water Report Takes a Hard Look at Central Asia, A EurasiaNet Partner Post from RadioFreeEurope/RadioLiberty. Electronic Document, http://www.eurasianet.org/departments/civilsociety/articles/pp031206.shtml, accessed September 21, 2007

Orlovsky, L. and N.
2003 Water resources of Turkmenistan: Use and conservation. The Jacob Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Sede Boker Campus, Israel

The State of Environment of Turkmenistan
1999 The State of Environment of Turkmenistan, Electronic Document, http://enrin.grida.no/htmls/turkmen/soe2/index.htm, accessed September 19, 2007

UNICEF
2007 UNICEF: Turkmenistan, Electronic Document, http://www.unicef.org/turkmenistan/index.html, accessed September 19, 2007

The World Bank
2004a The World Bank: Data and Statistics for Turkmenistan, Electronic Document, http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/TURKMENISTANEXTN/0,,menuPK:300761~pagePK:141132~piPK:141109~theSitePK:300736,00.html, accessed September 21, 2007
2004b The World Bank: Implementation Completion Report (SCL-41710 TF-25244 PPFB-P3120) on a Loan in the Amount of US $30.3 Million to the Government of Turkmenistan for the Turkmenistan Water Supply and Sanitation Project. Document of The World Bank, Report No: 27758-TM.

CIA World Factbook
2007 The World Factbook on Turkmenistan, Electronic Document, https://www.cia.gov/library/publications/the-world-factbook/geos/tx.html, accessed September 21, 2007

The World Health Organization National Environmental Health Action Plan
2002 The WHO National Environmental Health Action Plan, Electronic Document, http://www.euro.who.int/document/EHP/tkm.pdf, accessed September 19, 2007

Damming the Pehuenche: The Effects of Ralco

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Introduction

In the mid 1990's, Chile, the country that runs along the western coast of South America, faced a rising problem of creating electric energy to supply its growing cities. The Ralco dam project of Central Chile was initiated in order to mitigate this problem, and carried out due to a number of global and national factors, including many of Chile's past presidents' economic policies. Globalization's part in the project became larger over the years as the government's economic policies became more focused towards development on an international scale (Hudson 1994). Ralco was built by Endesa, the Spanish-owned energy corporation that controls the majority of electrical energy sources for Central Chile. Construction of the Ralco on Upper Bío Bío River in Central Chile has resulted in many detrimental effects to the natural and cultural landscape of the area. The construction and operation of Ralco led to the disruption of the environment in the Upper Bío Bío region and the devastation of the Pehuenche culture. The Pehuenche are an indigenous group whose ancestral home is in the Upper Bío Bío River valley of Central Chile and whose culture is based on their relation ship with this land. This paper will focus on the effect Endesa and its Ralco dam has had on this society.

1930-2007: A Brief History of Chile's Economic Development

From the 1930s-70s, Chile's was one of the most state-oriented economies in Latin America (Hudson 1994). It was dominated by the philosophy of import-substitution industrialization, an economic growth strategy that attempts to increase growth in domestic industries by limiting the amount of goods that are imported (Hudson 1994). During this time, the industrial sector was extremely inefficient and relied on heavy government subsidies. These decades were marked by a number of failed attempts to curb rising rates of inflation, which became a serious problem (Hudson 1994).

The Popular Unity socialist party headed by Salvador Allende took governmental control in 1970. During his three years in office, Allende attempted to implement socialist economic policies (Hudson 1994). Allende nationalized most of Chile's private industries and banks and collectivized private-owned lands, resulting in a sharp decline in domestic production of goods, severe shortages of consumer goods and extremely high rates of inflation. This "experiment in socialism" (Hudson 1994) ended in 1973 with the bloody military coup led by General Augusto Pinochet.

Pinochet's administration lasted until 1990 and was characterized by a strong move towards a

free market economy. His time in office was noted for its economic successes and severe human rights violations. During his rule, there were thousands of deaths and disappearances, and tens of thousands of people were tortured or exiled. Among those most targeted were political dissidents, political opponents and those believed to have had links with President Allende.

Pinochet's term is generally broken into two periods (Hudson 1994). During the first period - 1973-1982 - he implemented most of his free market reform policies. These included a move towards the full globalization of Chile's economy by reducing import tariffs and abolishing import quotas and the privatization of many national industries, including social security and health care (Hudson 1994). The second period lasted from 1982-1990. This period is characterized by national economic recovery and a slow move towards democracy (Hudson 1994). During this time, Pinochet consolidated his economic reforms and inflation was successfully reduced. He established a strong market-oriented system and placed heavy emphasis on individualism and consumerism to further the nation's involvement in the global economy. Pinochet also experienced a loss of support during these years as his enemies began to gain momentum (Hudson 1994). From 1983-1985 several protests against Pinochet were held and the previously dormant Socialist and Democratic political parties were able to once again gain strength and popular support. This culminated in the 1989 democratic elections, in which a new president, Patricio Alywin, was elected (Hudson 1994).

The 1990s saw an extreme economic boom for Chile, which was largely a result of this comprehensive transformation towards a free market economy and improvements in productivity in the industrial sector. Alywin inherited one of the strongest economies in Latin America and chose to keep it this way by supporting an export-oriented economy based on the policies of Pinochet (Hudson 1994). One of the earliest decisions of his administration was to open Chile's economy to international competition by reducing import tariffs from 15% to 11% on non-luxury goods (Hudson 1994). One of the governmental sectors that benefited from increased international competition was the industrial and energy sector. Globalization became a factor in Chile’s energy development when international companies such as Endesa España took control of the major utility sector.

Endesa and its Dams

Empresa Nacional De Electricidad Sudamericano (Endesa), Chile’s largest private energy company, controls all of Central Chile’s hydroelectric power, which makes up 55% of the region’s total electricity needs (Downing 2001:8). Endesa is one of the many companies that the state privatized during Augusto Pinochet’s dictatorial reign. In 1999 Endesa Chile was brought under control of Endesa España (Aguirre “Endesa España” 1999).

In the 1960s, Endesa began plans to construct a series of hydroelectric dams along the Bío Bío River (Fernandez 1998:4). Of the 6 dams planned, two have been built so far. These dams, Pangue and Ralco, are interdependent (Lindsey 2004:78). Pangue, the first to be built, depends on Ralco dam located upstream in order to function properly.

President Alywin approved the plans for Pangue in 1990. Construction for Pangue began in 1992 and was met with fierce opposition from the families who would have to be relocated in order to

build the dam (Lindsey 2004:87). To try and convince these families to sell their land, Endesa lawyers and sociologists gave out gifts and collected signatures (Downing 2001:8). Pangue was built with an investment loan from the IFC, a branch of the World Bank. The IFC loan was given to Endesa on the condition that Pangue was to be the only dam to be built on the Bío Bío River (Downing 2001:8). The Grupo de Accion de Bío Bío and other environmental and indigenous rights groups protested this loan, saying that in order for the Pangue dam to function efficiently, Ralco would be necessary (Lindsey 2004:82). Though planning for Ralco had already begun at this point, the IFC did not pull out funding for Pangue, and the dam was completed in mid 1994.

Official plans for Ralco were announced in 1992 (Aguirre “March Opposing” 1999), followed by warnings from many national and international organizations that the dam would be an unnecessary development for the region's energy needs and would have an extremely harmful effect on the environment and indigenous cultures in the surrounding area. Ralco was approved during the presidency of Eduardo Frei, who some argue had conflicting interests surrounding his support of the dam (Alywin 2002).

During his presidency, Frei was an avid supporter of the Ralco dam. When the National Corporation of Indigenous Development (CONADI) argued that the dam was in violation of The Indigenous Law no. 19.253, Frei fired the Corporation's first two directors and hired a director whose beliefs were more aligned with his own (Abya Yala News 1995). The Indigenous Law states that Indigenous lands may not be sold to non-Indigenous buyers without the Indigenous community coming to a unanimous decision to sell the land. The Comisión Nacional de Media Ambiente (CONAMA) accused the dam to be in violation of another law, The Environmental Law no. 19.300, which states that all private environmental investments must be first approved by CONAMA.

Despite the disapproval of these two agencies, Frei approved plans for Ralco's construction on March 11, 2000, the last day of his presidency (Aguirre “Endesa España” 1999). He approved construction of the dam under the 1982 Ley General de Servicios Eléctricos, which justified the dam's construction under the assumption that it would provide needed electrical energy for the larger population (Lindsey 2004:88).

After plans for Ralco were approved, Endesa met strong opposition from national and international indigenous rights groups who argued that the construction of the dam would have devastating effects on the culture of the Pehuenche people, the indigenous group whose ancestral lands would be flooded by the dam's reservoir (Aguirre “Endesa España” 1999). To mitigate possible negative effects on the Pehuenche, Endesa created a company controlled development foundation and hired an anthropological consultant to evaluate the cultural state of the Pehuenche (Downing 2001:8). Although this consultant did no participatory analysis or fieldwork with the Pehuenche, they reported, “Pehuenche culture was destined to be homogenized into mainstream Chilean culture and advised that the company’s cultural programs facilitate this inevitable transition” (Downing 8).

The next section will be about this "inevitable transition" and the effect it has had on the Pehuenche culture, along with the negative effects the Ralco dam has had on the natural environment of the Upper Bío Bío River.

The Effects of Ralco

The Ralco dam has had many harmful effects on both the environment and the native Pehuenche culture from the area surrounding the dam. Many of these problems were forewarned by national and international environmental protection and indigenous rights groups, who cautioned of the harmful effects it would have on the environment and the destruction it would cause to Pehuenche society and culture.

The first set of problems the dam has caused is environmental. Included in this set are obvious effects such as endangering species and flooding the native rainforest, but there are also less visible, but equally significant effects such as interrupted water flow, possible volcanic activity, soil erosion, increased humidity, toxic gas emissions and the loss of opportunities for ecotourism (Fernandez 1998:4, Ascher 2005:16, Aguirre "Endesa España" 1999). Environmental groups have speculated that tremors caused by the dams construction, maintenance and possible failures may lead to increased activity of the 3 active volcanoes nearby, and that the dam's construction may cause toxic gases to leak into the air and water (Langman 2002). Also, before Ralco's construction, the upper Bío Bío was known in ecotourism circles to be one of the best kayaking rivers in the world. Because of the construction of Ralco, communities on the upper Bío Bío lost any opportunity for ecotourism that relies on a fast moving body of water (Aguirre "Endesa España" 1999).

The environmental effects most likely to gain international attention are the loss of native species of plants and animals and the flooding of thousands of acres of rain forest. The 155m tall Ralco dam has a total reservoir area of 3400 hectares (Fernandez 1998:4, Ascher 2005:16, Aguirre "Endesa España" 1999) and floods over 70 km of native river valley (Fernandez 1998:4, Lindsey 2004:79). Approximately 45% of the fauna and 60% of the flora in the surrounding are were affected by the dam (Abya Yala News 1995), including 8 species of fish, 9 species of reptiles, 10 species of amphibians and 27 species of mammals that have become endangered as a result of the dam (Abya Yala News 1995). This is the result of many unnatural elements the dam has introduced to the river. First of all, the 10km corridor between the dam itself and its powerhouse is entirely dry, while 60 km of the Bío Bío is devastated by inundation (The Miami Herald 2002). The introduction of a stagnant lake in the middle of this previously fast flowing river has had devastating affects on wildlife dependent on the river. These include retention of minerals in the water, which led to poor water and soil heath, and the disruption of water flow, an important factor in the health of fish and other aquatic species (Lindsey 2004:77-78). In addition to harming aquatic life, these factors have also affected the quality of drinking water for nearly one million Chilean citizens who live downstream (Lindsey 2004:77-78).

There are also a number of less obvious after-effects of the construction of Ralco that have had a significant impact on the environment. Increased humidity, introduced construction-related sediments and extreme fluctuations in water levels have in the area of the dams construction have all lead to increased soil erosion, which can lead to landslides and an inability for forest regeneration (Lindsey 2004:77). Although these environmental effects are severe, the fundamental concern of this paper is the destructive effect of Ralco on the indigenous Pehuenche culture.

Ralco's Effect on Pehuenche Culture and Society

The Pehuenche Indians of Central Chile are members of the larger Mapuche group. They are the only Mapuche who, before the construction of Ralco, still lived by their traditional way of life, and they are the most traditional indigenous group in all of Chile (Downing 2001:8). The Pehuenche retain strong cultural ties to the land their people have inhabited for thousands of years, saying that their land is the basis for their culture (Downing 2001:8). By relocating hundreds of Pehuenche and flooding thousands of acres of their ancestral lands, Endesa the Ralco dam have damaged kinship ties, undermined traditional leadership roles and destroyed innumerable sites of tremendous historic and cultural value (Downing 2001:8).

The process that had the greatest effect on Pehuenche society was relocation. The 650 Pehuenche families who were relocated lost not only their land, but also their strong kinship bonds, their traditional way of life and their opportunity for future cultural development (Abya Yala News 1995, Langman 2002:7). Traditionally, the Pehuenche have lived in close contact with one another due to their geographical location in the Upper Bío Bío river valley. The strong kinship ties formed between families rely on this close and frequent communication (Langman 2002:7). The families that were moved to make room for Ralco were split up into three locations: one group went into the Andes, one to private owned farmsteads in the valley, and one was left behind in the Upper Bío Bío region. Splitting them up like this undermined traditional leadership roles and fractured many of the kinship bonds that they need to keep their culture strong and alive. It also deprived these groups of families of maintaining their traditional lifestyle of subsistence farming. The groups that were forced out of the area that they are accustomed to living and farming on went from being self-sustaining with room for growth to relying on wage labor, tourism and imported goods to survive.

In order to identify what kind of effect Ralco would have on their culture, Endesa hired an anthropologist working through their company run foundation to mitigate the cultural impact. Although this anthropologist did no fieldwork or participatory analysis with the Pehuenche, he/she told Endesa that the Pehuenche would inevitably be integrated into the larger Chilean culture; therefore Endesa would be helping them by initiating this process (Downing 2001:8). Based on this information, Endesa claims that the relocated Pehuenche are doing better now on their new lands because they have access to modern amenities that were not provided to them by their traditional way of life, such as contemporary housing and wage-labor employment (Aguirre "Endesa España" 1999). Many Pehuenche who had moved claim that the transition has negatively affected their lives and that if they could go back in time they would not have given up their lands (Downing2001: 8). They also claim that when Endesa came to purchase their lands, they used dishonest and illegal methods to convince families to relocate.

According to Chile's Indigenous Rights Law, indigenous people have the sole right to their land unless the community comes to a unanimous decision to sell the land to non-indigenous buyers (Lindsey 2004:80). When Endesa began collecting signatures to facilitate the transition, they did not tell the Pehuenche that they had a choice in the matter. They were not educated about The Indigenous Law, and in many cases only sold their land because they were made to feel that it

was inevitable that Endesa would win, therefore they should take whatever compensation they could get while it was available (Lindsey 2004:81).

In conclusion, the construction of the Ralco dam has had a devastating effect on the society and culture of the indigenous Pehuenche peoples in the area. The relocation of hundreds of families and the flooding of thousands of acres of ancestral lands has led to fractured kinship bonds, a lack of cultural development and feelings of regret by families who were forced off of their lands by Endesa.

Conclusion

In this paper I have discussed the many harmful effects the Ralco dam has had on the aquatic and land ecosystems of Central Chile's Upper Bío Bío region and on the society of the Pehuenche peoples. The environmental effects have been devastating, including the endangering of many species of aquatic animals, land animals and plant life, and the destabilization of the entire river ecosystem. Even more devastating than these consequences, however, is the effect the damn's construction has had on the Pehuenche culture. Ralco has undermined kinship bonds and leadership roles that were formed over thousands of years, and forced many of Chile's most traditional group into an unwanted and unnecessary lifestyle of capitalism. The dam has affected not only the physical landscape of the Upper Bío Bío, but also the social landscape.


Chile
Railroad
Road
0 100 200 300 400 Miles
0 100 200 300 400 Kilometers
BOUNDARY REPRESENTATION IS NOT NECESSARILY AUTHORITATIVE
Isla Sala y Gómez
Easter Island
(Isla de Pascua)
Mataveri
Peru
Bolivia
Brazil
Paraguay
Argentina
Uruguay
Pacific Ocean
Atlantic Ocean
La Paz
Sucre
(Legal capital)
Oruro
Santa Cruz
Arica
Iquique
Tocopilla
Antofagasta
Chuquicamata
La Quiaca
Salta
Asunción
San Miguel de Tucumán
Resistencia
Córdoba
Santa Fe
Rosario
Buenos Aires
La Plata
Mar del Plata
Bahía Blanca
Mendoza
Santiago
Valparaíso
Talca
Concepción
Temuco
Valdivia
Osorno
Puerto Montt
Castro
Ancud
Puerto Aisén
Península de Taitao
Isla de Chiloé
Zapala
San Carlos de Bariloche
Rawson
Comodoro Rivadavia
San Julián
Santa Cruz
Porvenir
Punta Arenas
Ushuaia
Isla de los Estados
Cape Horn
(Claimed by Argentina and Chile)
FALKLAND ISLANDS
(U.K.)
(Claimed by Argentina)
Isla San Ambrosio
(Chile)
Isla San Félix
(Chile)
ISLAS JUAN FERNÁNDEZ
(Chile)
Río Salado
Río Colorado
Río Negro
Río Chubut
Río Deseado
Río Santa Cruz
Río Paraguay
Río Paraná
Río Pilcomayo
Río San Miguel
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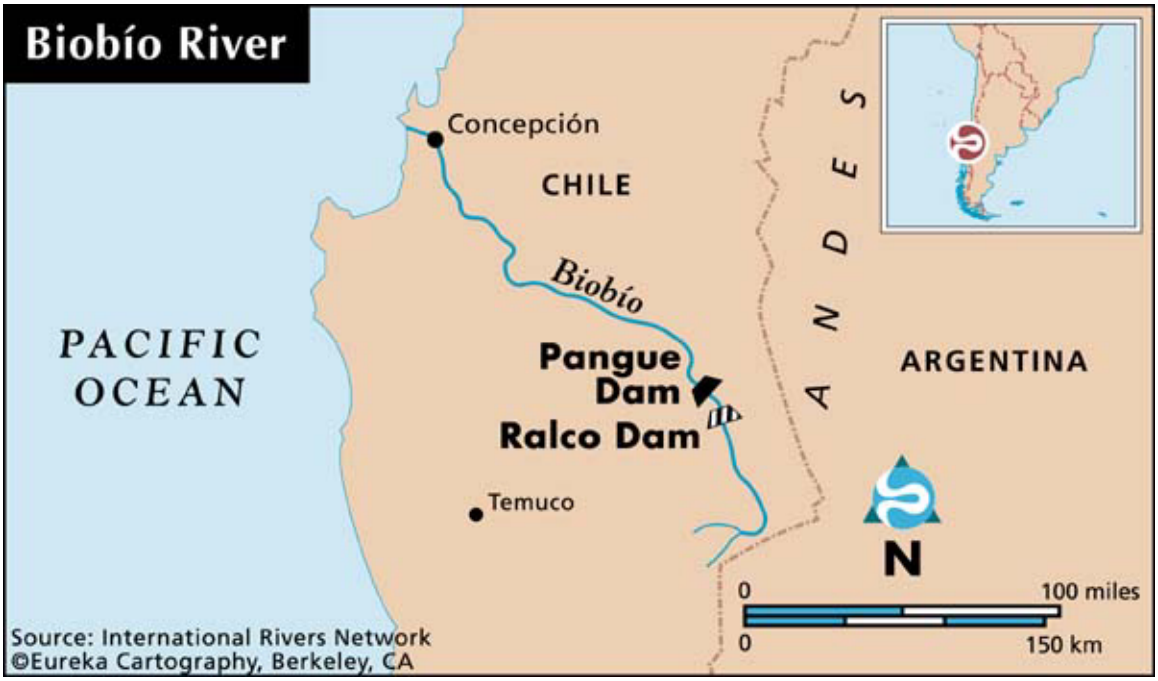

The Ralco Dam

Works Cited

Abya Yala News. Oakland: Mar 31,1995. Vol 9, Iss. 1; pg 27

Aguirre, Monti. "March Opposing Ralco Dam." Chip News 16 Apr. 1999. http://members.aol.com/mapulink2/english-2/news-33.html

Aguirre, Monti. "Endesa España Confirms Ralco Dam Commitment." Chip News 20 Sept. 1999. http://members.aol.com/mapulink2/english-2/news-44.html

Aylwin, José. "The Ralco Dam and the Pehuenche People in Chile: Lessons from an Ethno-Environmental Conflict". Conference Towards Adaptive Conflict Resolution. University of British Columbia, Vancouver, Canada: Sep 25-27, 2002

Ascher, Avery. "Aboriginal Peoples Responsible for Stewardship." Windspeaker 23 (2005): 16.
"Chile Dam Plan: Death of a Culture?" The Miami Herald 06 Nov. 2002. http://www.latinamericanstudies.org/chile/dam.html

Downing, Theodore E., and Carmen Garcia-Downing. "Plan B: What is Going to Happen to My People?" Cultural Survival Quarterly 25 (2001): 8. Ethnic NewsWatch.

Fernandez, Lydia. "Hemispheric Digest: Pehuenche Families Demand More Money From Spanish Power Company." Ethnic NewsWatch XV (1998): 4.

Hudson, Rex A., ed. Chile : a Country Study. 3rd ed. Washington D.C.: Ederal Research Division, Library of Congress, 1994. http://hdl.loc.gov/loc.gdc/cntrystd.cl.

Lafranchi, Howard. "Indians, Environmentalists Vow Rough Water for Chile Dam." Christian Science Monitor 21 May 1998. http://ww.csmonitor.com/durable/1998/05/21/fp7s1-csm.htm.

Langman, Jimmy. "Chile Dam Plan: Death of a Culture?" The Miami Herald 06 Nov. 2002..
Native Americas. Ithaca: Sep 30, 1996. pg 7.
http://www.latinamericanstudies.org/chile/dam.html

Lindsey, Robert. "Unsustainable Development in the Southern Cone: the Ralco Dam Project." Journal of Politics & Society Vol. XV, 2004. pg 74-92.
http://www.columbia.edu/cu/helvidius/files/2004-essay3.pdf

Review of Globalization's Effect on the Spread of the West Nile Virus to North America

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Background

In August and September of 1999, New York City and the surrounding areas experienced cases of human encephalitis linked to the death of several birds of various species (Lanciotti et al., 1999). Serum analysis collected from afflicted individuals implicated a flavivirus as the likely cause of the illness (Lanciotti et al., 1999). The complete genome of flavivirus-like particles recovered from the brain tissue of a dead Chilean flamingo (*Phoenicopterus chilensis*) was sequenced by the Center for Disease Control and Prevention (CDC) for study (Lanciotti et al., 1999). This, along with the analysis of sequenced envelope glycoprotein (E-glycoprotein) genes recovered from two fatal human cases, mosquitoes, and several bird species confirmed the presence of a species of the West Nile virus (Lanciotti et al., 1999). Although very similar to other species of the West Nile virus, this strain has been classified as a new species: WN-NY99 (Lanciotti et al., 1999). WN-NY99 also represents the first confirmed case of West Nile in the Western Hemisphere (Lanciotti et al., 1999).

Until this outbreak, the West Nile virus was isolated to Europe, the Middle East, Africa, and parts of Asia (Lanciotti et al., 1999). It was bound to these regions by the physical barriers of the Atlantic and Pacific oceans (Lanciotti et al., 1999). There has also been a species of West Nile identified as becoming specific to Australia as well (Lanciotti et al., 1999). This leads to the question of how did the virus cross the oceans to infect both Australia and North America. Of the species affected by the West Nile virus: birds, horses, mosquitoes, and humans- only humans can and do travel freely across and between these continents in a matter of hours.

Globalization

Globalization is a wide ranging topic affecting every aspect of modern human life (Robbins 2000). It is closely intertwined with the spread and practice of capitalism, bringing together thousands of people who would otherwise be isolated on opposite ends of the globe (Robbins 2000). The economic factors of globalization can be best described through a core-periphery relationship between countries (Robbins 2000). Leading industrialized capitalist countries such as the United States, England, and Japan are considered to be the core countries (Robbins 2000). In turn, many African and South American countries are among those considered to be in the

periphery (Robbins 2000). Resources are extracted from the periphery for the economic benefit of the core, creating an ever widening gap of political and economic power between the two ends (Robbins 2000).

Conditions in the periphery are often very poor, serving as reservoirs for infectious diseases (McMichael et al., 1999). The demands of the core countries are continuously causing peripheral countries to expand their population zones, pushing back their frontiers, and exposing the local peoples to more and more infectious diseases (Daszak et al., 2000).

Geographic distance means almost nothing in today's global economy; information can be sent instantaneously to and from any urban center. This allows corporations to effectively operate from multiple locations around the world. Coupled with this global economic mobility is the staggering human ability to physically travel the globe in a matter of hours. The high speed of travel for data, people, and materials means that corporations are not geographically bound to any one area, making outsourcing possible. Outsourcing occurs for the economic benefit of the company, taking advantage of cheap labor in peripheral countries. The building of manufacturing plants, large industrial ranches, and distributions centers displaces the local people. This often pushes them further and further into their frontiers in search of adequate land to live and subsist on. As people are driven further into the frontiers they encounter more and more diseases that humans are not normally exposed to. These diseases are then able to cross over into human populations. Millions of people and thousands of tons of cargo cross great distances each day by airplane, train, and ship (Robbins 2000). Pathogens take advantage of this travel network as well. Emerging infectious diseases (EIDs) such as AIDS quickly become global threats (Daszak et al., 2000).

These traveling diseases can be classified as to having three modes of relocating: spill-over from domestic animals to wildlife populations, human intervention through host or parasite translocations, and EIDs with no direct human or domestic animal involvement (Daszak et al., 2000). Spill-over EIDs occur where domestic animal populations are kept in close proximity with wildlife populations (Daszak et al., 2000). Large domestic herds serve as reservoirs for infectious agents, which then infect indigenous species (Daszak et al., 2000). These EIDs are extremely detrimental to endangered species populations, and this relationship works in the opposite direction as well (Daszak et al., 2000). Spill-back EIDs are those that come originally from wildlife populations and infect domestic animal populations (Daszak et al., 2000). These EIDs have a high risk of then infecting human populations.

The second category of EIDs, caused by human translocation of hosts and parasites, occurs when species are purposely moved into new environments (Daszak et al., 2000). This creates potential new hosts for parasitizing, which in turn facilitates the spread of pathogens into new species (Daszak et al., 2000). The rise of this kind of EID corresponds to increased travel and commerce by humans (Daszak et al., 2000).

The third category of EIDs is those with no direct human or domestic animal involvement (Daszak et al., 2000). These are EIDs associated with global climate change from events such as El Niño and global warming (Daszak et al., 2000). Such environmental events can increase the

intensity of parasite populations and host mortality rates or change the host-parasite relationship to include previously non-parasitized species (Daszak et al., 2000).

In addition to causing the rise of infectious diseases globally, human dominance over the environment has lead to an increase in homogeneity in biodiversity (Daszak et al., 2000). The mechanism for such homogeneity is widespread introduction of foreign plant and animal species to new environments (Daszak et al., 2000). Success of the new species in the system correlates to the decline of native species, and in the case of pathogens, indigenous species are killed off in favor of the introduced (Daszak et al., 2000). Parasites attack the most common allele frequencies in a population. As homogeneity increases, the variation between allele frequencies becomes smaller.

Human involvement in the translocation of an infected host is one possible theory for how the West Nile virus was able to cross the oceans. The exact path the virus took to the United States it is still unknown (Lanciotti et al., 1999). However, it is known that there is much genetic similarity which relates WN-NY99 closely to WN-Israel 1998, a species first observed in Israel in 1998 (Lanciotti et al., 1999). WN-NY99 represents just how successful a pathogen can be when introduced into a new environment. Each time people are forced to go deeper into their frontiers, there is the potential to be exposed to a new pathogen.

The West Nile Virus

The West Nile virus belongs to the family Flaviviridae in the genus *flavivirus* (Lanciotti et al., 1999). Flaviviruses are plus-sense, single-stranded RNA viruses with genomes of approximately 11,000 nucleotides (Lanciotti et al., 1999). The West Nile virus is a member of the Japanese Encephalitis serocomplex, which also includes Japanese encephalitis (JE), St. Louis encephalitis (SLE), Murray Valley encephalitis (MVE), and Kunjin viruses (KUN) (Lanciotti et al., 1999). The phylogeny of the virus can be seen in figure 1. Members of the JE serocomplex have distinctive geographic distributions and are held in the natural transmission cycle by mosquito hosts and bird reservoirs (Lanciotti et al., 1999). In addition, humans and horses have sometimes become accidental hosts (Lanciotti et al., 1999).

Isolation and identification of the virus began in late August 1999 during the outbreak of encephalitis in birds (Anderson et al., 1999). Mosquitoes were identified as the host vector for the disease, and St.Louis encephalitis was initially believed to be the agent (Anderson et al., 1999). On September 5^{th,} mosquito traps were placed in Greenwich, Connecticut; located eighteen miles northeast of Bronx County (Anderson et al., 1999). Additional traps were placed in the town of Stamford, Connecticut on September ninth, and later in twelve more towns in Fairfield County, Connecticut (Anderson et al., 1999). There were reports of crows (*Corvus brachyrhynchos*) dying in this county during the second week of September (Anderson et al., 1999). A total of 3,398 mosquitoes, 28 dead crows, and 1 dead Coopers Hawk (*Accipiter cooperii*) were collected and tested for viruses by mid October 1999 (Anderson et al., 1999). An antigen is a substance that enters the body and triggers the production of antibodies as a form of resistance to infection. Cell lysate antigen from viruses isolated from two species of mosquito, *Culex pipiens* and *Aedes vexans*, reacted in an enzyme-linked immunosorbent assay (ELISA) with mouse antisera to the SLE virus (Anderson et al., 1999). Crows, in which a virus was isolated, showed histopathologic evidence (tissue damage) of viral encephalitis (Anderson et al.,

1999). Cell lysate was prepared and gave a positive reaction in an ELISA test to mouse immune antisera to SLE (Anderson et al., 1999). A portion of the viral genome was sequenced using samples taken from four hosts (Anderson et al., 1999). From the 921 base pair (bp) region that was sequenced, these four samples only differed by three nucleotides in positions 322, 620, and 662 (Anderson et al., 1999). The isolated genome from a sample taken from a crow differed from Romanian WN 130362, Romanian WN 130363, Kunjin, JE, and SLE viruses at positions 26, 33, 101, 176, 297, and 333 (Anderson et al., 1999). This showed a difference of 2.8% to Romanian WN 130362 and 3.6% to Romanian WN 130363 (Anderson et al., 1999).

Viral RNA isolated from the brain tissue of a dead Chilean flamingo from the Bronx Zoo in New York City was amplified and copied into overlapping DNA fragments through the use of the reverse transcription polymerase chain reaction (RTPCR) (Lanciotti et al., 1999). The DNA fragments were about 2,000 to 3,000 base pairs in length, and sequenced by the use of primers spaced 400 bp along the genome (Lanciotti et al., 1999). This species is identified as WN-NY99 (Lanciotti et al., 1999). The complete amino acid sequence of the coding region of the genome can be seen in figure 2. This region spans from nucleotides 97 to 10,395 (Lanciotti et al., 1999). The WN-NY99 coding sequence is consistent with the standard flavivirus genomic organization (Lanciotti et al., 1999). It begins with a 5' noncoding region of 96 nucleotides with an ATG initiation codon in the 97th position (Lanciotti et al., 1999). This is followed by an open reading frame of 10,302 nucleotides (Lanciotti et al., 1999). This region codes for the capsid, premembrane proteins (prM), envelope proteins, and five nonstructural proteins: NS1, NS2a/NS2b, NS3, NS4a/NS4b, and NS5 (Lanciotti et al., 1999). The WN-NY99 genome is then concluded by a 3' noncoding region of 631 nucleotides (Lanciotti et al., 1999).

Identification of the virus was concluded by the use of immunoflourescence antibody tests (Lanciotti et al., 1999). This test used monoclonal antibodies (mAbs) which are specific to the E-glycoprotein, allowing them to distinguish between WN viruses and KUN viruses (Lanciotti et al., 1999). Isolates from birds and mosquitoes were mapped using mAbs, and the titers were compared to titers derived from representatives of the JE serocomplex (Lanciotti et al., 1999). All viruses showed a positive reaction with the broad flavivirus-reactive control mAb 4G2, while none reacted with the negative control specific for the E1-glycoprotein of eastern equine encephalitis (EEE) (Lanciotti et al., 1999). All of the WN controls, as well as all of the viruses isolated in North America, reacted positively with the WN specific mAb H5.46 and negatively with the KUN specific mAb 10A1 (Lanciotti et al., 1999). This eliminated the possibility of a KUN virus (Lanciotti et al., 1999). There were also negative reactions for the SLE specific mAb 6B5A-2 and Murray Valley specific mAb 4B6C-2 (Lanciotti et al., 1999).

To determine WN-NY99's relationship with other WN viruses, a region of the E-glycoprotein gene was analyzed (Lanciotti et al., 1999). Aligned nucleic acid sequence data was analyzed by algorithms for parsimony (PAUP), distance (MEGA), and maximum likelihood (fastDNAml) (Lanciotti et al., 1999). The resulting phylogenetic tree is shown in figure 1. The tree shows two distinct lineages. Lineage 1 is composed of viruses found in West African, Eastern Europe, the Middle East, and Australia and Lineage 2 is composed of virus specific to Africa only (Lanciotti et al., 1999). Lineage 2 viruses are not reported to be involved with human outbreaks (Lanciotti et al., 1999).

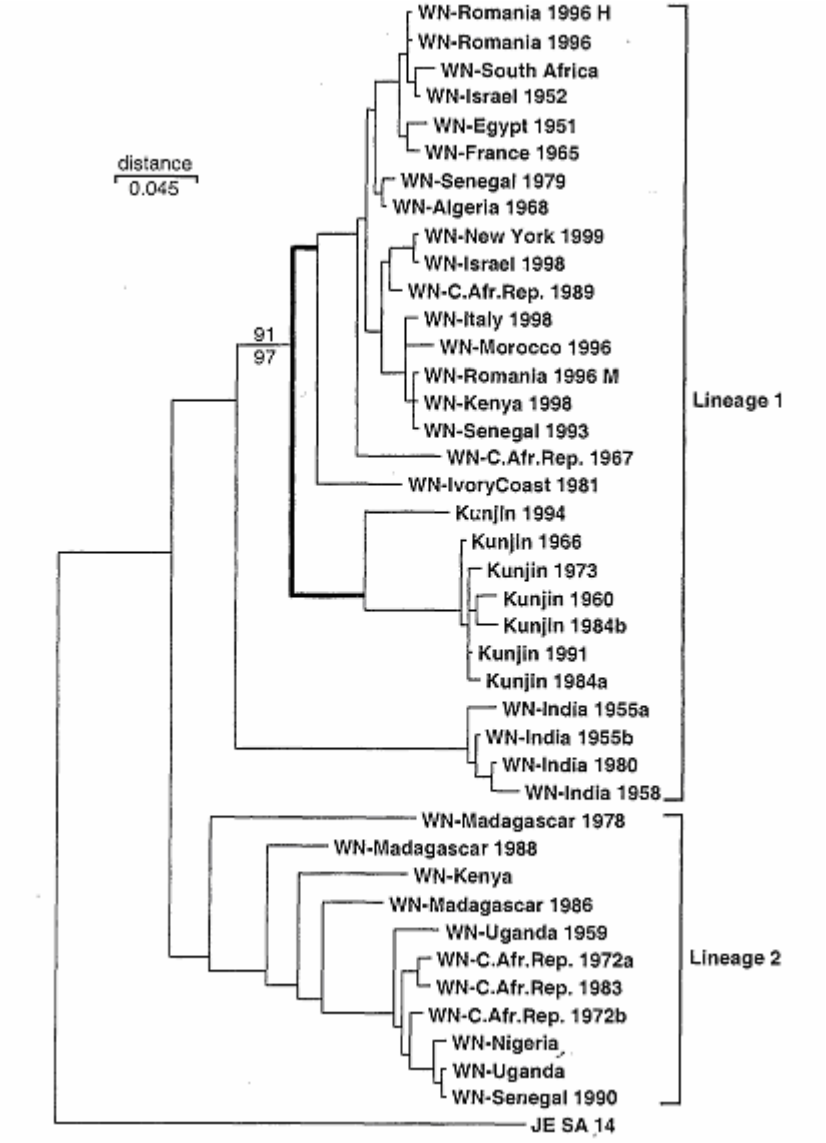
It is shown that WN-NY99's closest genetic relative is WN-Israel 1998, which was isolated from brain tissue of a dead goose in Israel in 1998 (Lanciotti et al., 1999). This relationship was explained through analysis of the coding regions for the prM and E proteins, from base pair positions 549 to 1846 (Lanciotti et al., 1999). This analysis confirmed the presence of a single strain of WN virus in North America, as well as showed a >99.8% similarity with WN-Israel 1998 (Lanciotti et al., 1999). Within the 1278 nucleotide region analyzed, only two nucleotides differed (Lanciotti et al., 1999).

Conclusion

The spread of the West Nile virus has been facilitated by human alteration of the environment. The virus that was once restricted to Africa, the Middle East, Europe, and Asia has been able to cross the ocean and become established in eastern North American ecosystems (Lanciotti et al., 1999; CDC 2002). In 2001, the CDC confirmed sixty-six human cases in thirty-nine counties from ten states in the US (CDC 2002). It was predicted after the first outbreak that the virus would enter the normal North American transmission cycle, using ticks and mosquitoes as hosts with avian reservoirs (Lanciotti et al., 1999). Particular attention is being paid to Florida, which is reporting year round transmission (CDC 2002). This has been confirmed due to the virus's persistence within the populations, as well as the presence of West Nile antibodies in patients (Sejvar et al., 2003).

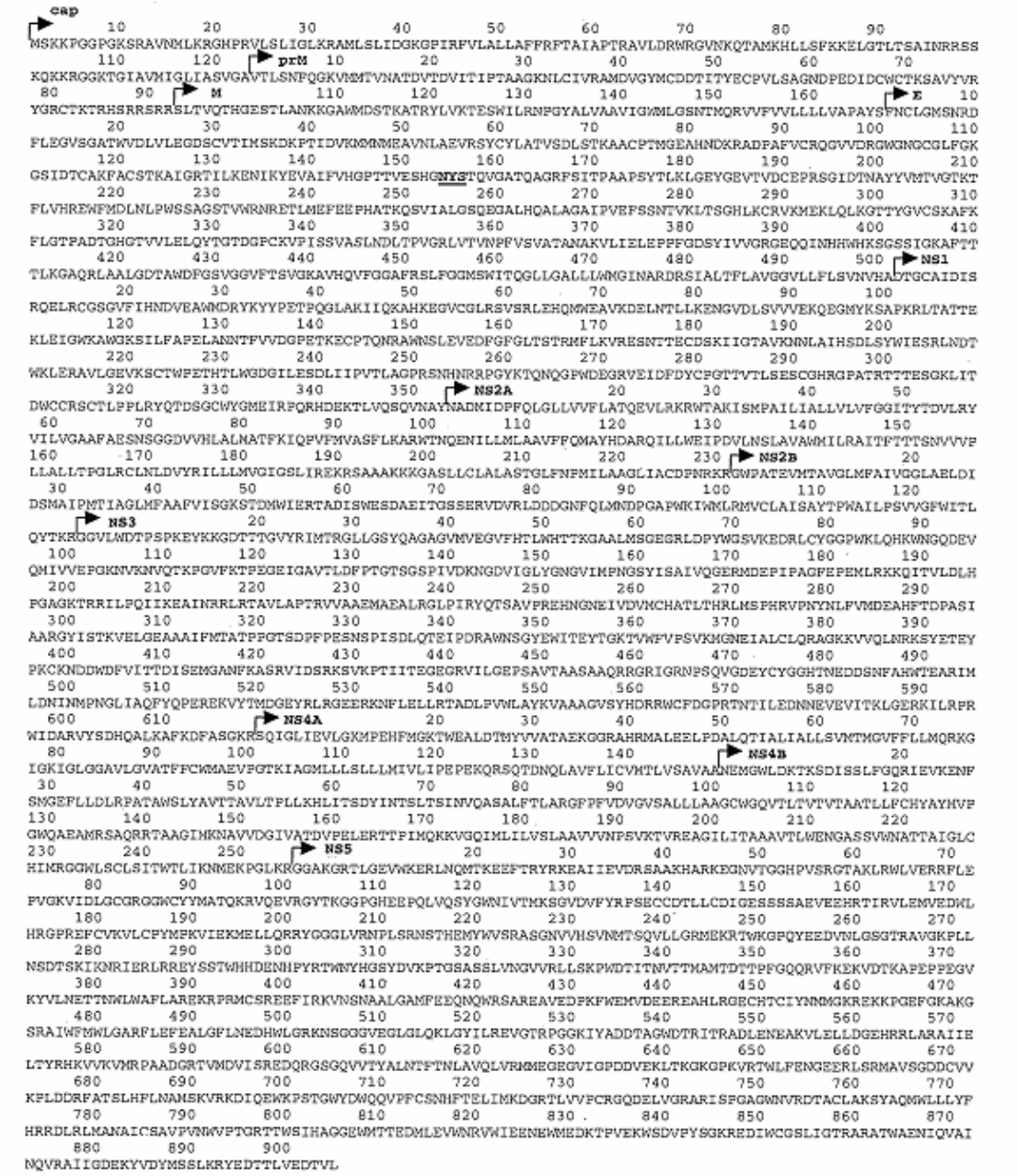
In 2002, a study recorded patients who tested as West Nile seropositive also demonstrated movement disorders, such as tremors, myoclonus, and Parkinsonism (Sejvar et al., 2003). It was shown that these disorders may be present during acute West Nile illness, but some patients ultimately have a good long-term outcome (Sejvar et al., 2003). There is, however, the possibility for an irreversible poliomyelitis-like syndrome (Sejvar et al., 2003). These patients suffer from a permanent loss of motor neurons in affected areas of the spinal cord (Sejvar et al., 2003). Prevention methods being employed to combat the virus are: continued public education programs about personal protective measures against mosquitoes, the development of community level mosquito surveillance and management programs, and a high priority control of urban Culex mosquito populations (CDC 2002).

Figure 1



The phylogenetic tree shows the evolutionary relationship between species the E-glycoprotein nucleic acid sequences found in the viral genomes. Each split in a branch shows a variation in the genome and the line of decent from the common ancestor (Recreated from Lanciotti et al., 1999).

Figure 2



Deduced amino acid sequence of the polyprotein of West Nile virus WN-NY99. The start of each protein is marked by an arrow. Abbreviations for protein names: cap, nucleocapsid; prM, premembrane protein; M, viral membrane protein; E, viral envelope glycoprotein; NS1 to NS5, viral nonstructural proteins. The E-glycoprotein glycosylation motif (NYS) is underlined. Single-letter abbreviations for amino acid residues are as follows: A, Ala; C, Cys; D, Asp; E, Glu; F, Phe; G, Gly; H, His; I, Ile; K, Lys; L, Leu; M, Met; N, Asn; P, Pro; Q, Gln; R, Arg; S, Ser; T, Thr; V, Val; W, Trp; and Y, Tyr.

Genomes are written from the five prime end (5') to the three prime end (3') which indicates the direction that the sugars in the backbone of the DNA bond to each other. The written genome shows one strand of the double stranded DNA helix. The open reading frame is the area of the genome that is actively transcribed to synthesis proteins (Recreated from Lanciotti et al., 1999).

Works Cited

Anderson , John F.; Andreadis, Theodore G.; Vossbrinck, Charles R.; Tirrell, Shirley; Wakem, Edward M.; French, Richard A.; Garmendia, Antonio E.; Van Kruiningen, Herbert J.
Dec 1999 "Isolation of West Nile Virus from Mosquitoes, Crows, and a Cooper's Hawk in Connecticut" *Science*, New Series, Vol. 286, No. 5448, pp. 2331-2333

Barrett, Ronald; Kuzawa, Christopher W.; McDade, Thomas; Armelagos, George J.
1998 "Emerging and Re-Emerging Infectious Diseases: The Third Epidemiologic Transition" *Annual Review of Anthropology*, Vol. 27, pp. 247-271

Daszak, Peter; Cunningham, Andrew A.; Hyatt, Alex D.
Jan 2000 "Emerging Infectious Diseases of Wildlife-Threats to Biodiversity and Human Health" *Science*, New Series, Vol. 287, No. 5452, pp. 443-449

Kates, Robert W.; Parris, Thomas M.
Jul. 2003 "Long-Term Trends and a Sustainability Transition" *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 100, No.14, pp. 8062-8067

Lanciotti. R. S.; Roehrig. J. T.; Deubel, V.; Smith, J.; Parker, M.; Steele K.; Crise B.; Volpe, K. E.; Crabtree, M. B.; Scherret, J. H.; Hall, R. A.; MacKenzie, J. S.; Cropp, C. B.; Panigrahy, B.; Ostlund, E.; Schmitt B.; Malkinson, M.; Banet, C.; Weissman, J.; Komar, N.; Savage, H. M.; Stone, W.; McNamara, T.; Gubler, D. J.
Dec.1999 "Origin of the West Nile Virus Responsible for an Outbreak of Encephalitis in the Northeastern United States" *Science*, New Series, Vol. 286, No. 5448, pp. 2333-2337

McMichael, Anthony J.; Bolin, Bert; Costanza, Robert; Daily, Gretchen C.; Folke, Carl; Lindahl-Kiessling, Kerstin; Lindgren, Elisabet; Niklasson, Bo
Mar 1999 "Globalization and the Sustainability of Human Health" *BioScience*, Vol. 49, No. 3, pp. 205-210

Robbins, Richard H.
2008 "Global Problems and the Culture of Capitalism" Boston, Massachusetts: Allyn and Bacon

Sejvar, James J.; Haddad, Maryam B.; Tierney, Bruce C.; Campbell, Grant L.; Marfin, Anthony A.; Van Gerpen, Jay A.; Fleischauer, Aaron; Arturo Leis, A.; Stokic, Dobrivoje S.; Petersen, Lyle R.
Jul 2003 "Neurologic Manifestations and Outcome of West Nile Virus Infection" *Journal of the American Medical Association*, 290: 511 - 515

THE CENTERS FOR DISEASE CONTROL AND PREVENTION:
Jul 2002 "West Nile Virus Activity—United States, 2001" *Journal of the American Medical Association*, 288: 158 – 160