University of Oregon

SOLAR INCIDENTS

The Newsletter of the Solar Information Center

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What is the Solar Information Center?

It is a student run organization sponsored by the ASUO and EWEB. The purpose of the center is to serve as a research, education, and information center on solar energy and alternative energies, and their applications in architecture and technology. One of its vital functions is to sponsor a lecture series on local, regional and global energy issues to promote a higher awareness toward conservation and renewable energy. The center also provides an in-house information source of books, periodicals, abstracts, proceedings, topic-files, and product-files.

SPECIAL THANKS TO **EWEB** FOR THEIR CONTINUED SUPPORT!

Changing Course

Water Shortage and Interbasin Water Transfer from the Salween Basin, Thailand.

By Atiya Achakulwisut

Scarcity and Abundance

"In the time of Father King Ram Khamhaeng this land of Sukhothai is good. In the waters are fish; in the fields are rice." (Pramoj 1990: 17) -circa 1238 CE

This stone inscription, dating back over 700 years to Sukhotha, an ancient kingdom of the Thai, thoroughly captures the people's perception of their resources. Never did the Thai people imagine that the abundance would decline, that one day the cornucopia of fish and rice would be a mere myth and that the water would run dry.

Located in the tropical zone to the south of China and to the west of India (see map page 8), peninsular Thailand has an abundance of freshwater. It is nurtured by 25 major rivers, with enough rain—an average of 800 million cubic meters per year—to hold a 1.7 meter-high flood throughout the country, provided that the water is not evaporated or absorbed. In spite of this natural abundance, however, Thailand now suffers from a shortage of water. Competition for water among agricultural, urban and industrial sectors as well as upstream and downstream users is intense. Competition is normally heightened from November to May, when the *monsoon* rain gives way to a long dry season.

Water scarcity is most critical in the Central Plain of Thailand. Surrounded by mountains to the west, north and east, the central region consists mostly of the Chao Phraya basin, the largest in Thailand. The area is characterized by flood plains and lowlands suitable for rice production. Known as the "ricebowl of Thailand," this heartland includes farm lands, rice fields, industries and Bangkok—the country's capital and most urbanized city.

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Bioregionalism in the Realm of Architecture, Part III

by Mark Serhus

This is the last of a three-part series on bioregionalism and architecture. The first part, which appeared in the Fall issue originated as a term paper for a Political Science class, "The Politics of Ecology". The second part expounded on the merits of bioregionalism in architecture and how bioregionalism may well develop into a discernible vernacular style. In this part, I set out to explore the economic parameters of material products selection in light of a bioregional ethic.

A Unique Way of Living

Visualize María Hernández walking away from the rail stop towards the Sabin neighborhood where she lives. A cool breeze blows through the Rose Quarter Arboretum off the Willamette River and the smell of alder and jasmine hint the promise of a sunny warm summer ahead. She is returning from a Sustainable Arts Workshop where she demonstrated the latest clean air technology. She walks along a wide pedestrian path lined with community gardens. The elaborate raised garden beds are constructed out of chunks of the asphalt and

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Bioregionalism
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concrete that years ago had their purpose as a ballast for the internal combustion transportation network.

As she steps into her home for the first time in 10 hours it is warm and light, a comfort. She checks the air quality monitors, then heads to her indoor garden to harvest dinner.

This is her domain. A fully sustainable home that provides her with all of her needs to live. Her home is totally dependent on the climate and the land that it rests. Her house catches drinking water from the sky; runs appliances and grows food from the light rays of the sun; regenerates her consumer wastes for permaculture reuse; and maintains the warm ambient air with highly insulative walls and thermally sustaining mass.

Doing business at home is the norm for sustaining households. Using the internet not only to communicate but to sustain herself economically, she earns "light points" for offering valuable information on the "economic domain network". She will use her earnings to trade material resources and to barter for health services. It is the year 2147, gone are the neoclassical economic models of the past.

The monetary, commodities and corporate systems have vanished. Autonomous communities have risen from the age of ecological demise. Forever gone are the days of transferring our ecological problems across space (shipping nuclear waste, building smokestacks), across time (passing it onto the next generation), and through a visual change (burning, burying or land-filling wastes). These are the days when the ideas of the architects Pliny Fisk, Sim Van der Ryn, and Buckminister Fuller have come to light. The ultimate resource is human ingenuity.

This is the day not only when *green* is good, but essential for existence. Social ecology pervades society as people witness a co-evolution between humankind and nature. Government can no longer sell the environment for the right to pollute or devastate. Integrated environmental management and sustainable living are the biggest "industries".

Bioregionalism is the dominant political paradigm that allows social and economic growth within the carrying capacity of the land while being supplemented by inter-bioregional trade. Nation states have given way to region states that have situated themselves with the necessary critical mass to be self-reliant and prudent regional traders.

Bioregionalism "is not utter self-sufficiency or the end of trade, but a self-reliance in basic provisions for reasons including community security, ecological sustainability and personal fulfillment. While not abjuring material comfort, most bioregionalists advocate some level of voluntary simplicity; viewing modern consumerism as evidence of a spiritual void left by the shattering of human communities and their connection with nature. Restoration of community life within the greater community of nature is the core goal of bioregionalism" (Mazza).

The architecture of this bioregional culture is the model of the society. This bioregional architecture would

(1) reflect local resources

(2) be built to benefit from the climate (not just withstand it)

(3) embrace a local culture

(4)stylistically reflect resources, climate, and culture in much the same way that ancient vernacular architecture has done.

The Ecological Truth

The fictional story about María is the prophetic end to an era where society asked, "how long will we continue to do things the old way?" It will take decades to change our typical day-to-day ways in this consumer based society. The place to start is to identify who and where we are.

Stuart Cowan of the Ecological Design Institute urges designers to define their "ecological footprint". In the keynote speech at the annual meeting of the Architects, Designers, and Planners for Social Responsibility he quotes the work of Canadian planners William Rees and Mathis Wackernagel:

"They reckon that a typical Vancouverite requires 2.7 acres for food, 1.2 acres for forest products, and 8.6 acres for bio-mass based fuels. Extrapolating these figures to the Bay Area, it would take a piece of ecologically productive land the size of California to renewably provide for just the food, forest products, and fuel for the Bay Area!"

We have entered an age of ecological enlightenment where we as designers are questioning conventions. Designers are discovering that the bottom line, lowest bidder, and the "most popular is the cheapest" mentality is costing our society greatly. The building industry generates at least 20% of the solid waste, consumes more than 11% of the total energy, and produces 30% of the greenhouse gases in the nation (Johnson).

As designers of the built environment we play the most crucial role. Architects, designers and planners set the stage for the success or ruin of society. As Cowan states, "A celebratory ecological aesthetic, combined with greatly increased energy and materials efficiency, systematic detoxification, and careful resource stewardship, can take us a long way towards a truly sustainable economy."

Life Cycle Costs

One way of discovering the ecological truth about the materials selections we make is to identify and quantify the environmental impacts on the bioregion. The Society for Environmental Toxicology and Chemistry (SETAC) has established three components of life cycle analysis (LCA):

(1) **Inventory analysis** catalogs and quantifies the energy, raw material requirements, atmospheric emissions, waterborne effluents and solid wastes;

(2) **Impact analysis** attempts to weigh the data from the inventory analysis based on the relative importance of the environmental effects that they quantify (Spicer);

(3) **Improvement analysis** allows for the redesign of the product, process or activity.

Impact analysis will be highly subjective—though necessary—for critical ecological judgments to be made. Another option would be to investigate how a material's by-product could be generated as a resource, not as a waste. The LCA materials and process accounting model could well endure as the ecological guideline of how our built environments impact our bioregion and the bioregion to which the materials are indigenous. LCA is an excellent example of how professionals outside of the field of design are providing valuable information for designers.

Success through Interdisciplinary Approach

Bioregionalism was pioneered through the disciplines of agriculture, economics, geography, political science, planning and social policy. Architect Pliny Fisk of the Center for Maximum Potential Building Systems has been the leader in the field of bioregionalism for designers. Fisk's gift is that he sees no boundaries in the discipline of architecture.

Fisk established a complete process of resource classification that will yield a true bioregional architecture. The success of this unique methodology can be attributed to the fact that architecture does not exist in a vacuum. Architecture is, like the ancient vernacular structures of indigenous people, thoroughly reliant on the resources of the land. If we are to be successful ecological designers one must remove themselves from the pressures of convention and the myopic view of our profession.

In the book *Ecological Design* Sim Van der Ryn and Stuart Cowan

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New Library Lists in Progress

The ***Solar Information Center Library List***, which currently includes over 150 book titles, will be expanded this spring to include **periodicals**, **reports**, and **videos** as well as **new book titles**. Once completed, this new information will appear at our website, along with the currently on-line book list. All are welcome to use the library during regular office hours; most holdings may also be checked out for up to two weeks with a refundable deposit. For a free printed copy of the current *Library List*, please call us at 346-3696 or stop by 219 Pacific Hall.

New on the Solar Center Web Site this spring is a *links page* to sites related to renewable energy, alternative building technologies and architecture. We also have a new logo. We will be adding links, putting the newsletter online and continuing development of the site throughout the term. **http://darkwing.uoregon.edu~sic/**

Sustainable Community Solutions Exhibit Visits the "Hearth" April 1 - 19

The University of Oregon's Wilcox Hearth Café (room 266 Lawrence Hall) will proudly display the winning entries of the American Institute of Architects (AIA) and International Union of Architects (UIA) 1993 world competition, ***A Call for Sustainable Community Solutions*** this spring. This milestone competition was held in conjunction with the June 1993 World Congress of the UIA and the annual convention of the AIA, the common theme of which was *Designing for a Sustainable Future*: "a call to architects, planners, engineers, designers, humanists, and social scientists from around the world to demonstrate whole system, interdisciplinary approaches to designing sustainable habitats".

Winning submissions explore four thematic areas:
-Energy & Resource Efficiency
-Healthy Buildings & Materials
-Land Use & Urban Ecology
-Comprehensive & Integrated Systems

This traveling exhibit showcases creative and elegant solutions to the challenges of sustainable building and development around the world. It will inspire many Hearth-goers while serving as a relevant backdrop during the **1996 Eco-Design Arts Conference: *Changing Paradigm, Changing Place* (April 11-14).** Please explore this important exhibit during the Hearth's business hours: M-F, 8am-5pm.

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The Solar Information Center
Holistic Options for Planet Earth Sustainability (HOPES)
Department of Architecture
School of Architecture & Allied Arts

Bioregionalism

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Sempore designers to make the shift beyond our newly defined ecological paradigms to balance architecture and ecology throughout all aspects of design, construction and culture.

"The second generation of ecological design must effectively weave the insights of literally dozens of disciplines. It must create a viable ecological design craft within a genuine culture of sustainability rather than getting entangled in interdisciplinary disputes and turf wars. It is time to bring forth new ecologies of design that are rich with cultural and epistemological diversity" (Van der Ryn, Cowan)

The Wealth of the Natural Economy

Historically, communities have always looked out for the common good. The world-wide human community and the natural economy upon which we rely is an isolated system on this biosphere called earth. The scale of the global ecological crisis is gargantuan, and for some, it is easier to look the other way.

First, designers needs to realize the wealth of the natural economy on the local level. By identifying and becoming intimately familiar with the resources of the bioregion a sense of pride will develop. Next, one can assess their material consumption by identifying wastes and investigating where these materials came from and where they will end up in the bioregion. Additionally, we need to assess the long-term value of our material possessions and to figure what attribute they have in lives and our bioregion. The final step would be a global view of our material lives: Are the materials from beyond our bioregion having a negative impact on the indigenous bioregion.

A Step Back for a Better Future

One of the basic aspects of living a life that respects ecology is to live in a simple manner. Indigenous cultures offer some of the most profound insight into how superfluous our lives are. We, in the west, are taught to weave a very complex web of existence. We often don't realize how self-degradating our existence is until we witness a horrific ecological disaster on a large scale (e.g., an oil spill, the plume from a paper mill, or the overwhelming size of a landfill). We have had enough ecological warnings to warrant a reassessment of our values and convictions in this material world. Cascadia Planet advocates us to simply, "Take a step back". If only one small step at a time, we will be heading in the right direction. A step back is what is needed for a better future●

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THE SOLAR INFORMATION CENTER
SPRING LECTURE SERIES & EVENTS CALENDAR

For more information, please contact us at 346-3696.

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To register for the upcoming *1996 Eco-Design Arts Conference*, contact HOPES @ (541) 346-0719, hopes@gladstone.uoregon.edu

"Sustainable Community Solutions"
An Exposition of the AIA's Design Competition Winning Entries of '93
April 1-19, 1996, room 266 Lawrence Hall (see pg. 4 for more information)

"Architecture- Planning Ecology" @ 1996 ECO Design Arts Conference
by Pliny Fisk
Saturday, April 13, 5 pm, room177 Lawrence Hall, U of O
Pliny Fisk III is the founder and co-director of The Center for Maximum Potential Building Systems in Austin, Texas. Both an architect and a landscape architect, his pioneering research focuses on the role of appropriate technologies in architectural design wihtin which he has developed a strong reputation for environmental design that is responsive to regional and cultural concerns. In recent years he has worked with city officials to develop Austin's Green Builder Program; an internationally recognized model for locally-based sustainable initiatives. He has won numerous awards including First Place on the 1986 National Endowment for the Arts Designing for Area Resource Efficiency Competition

"The Global Living Project"
by Jim Merkel
Thursday, April 25, 7:30 pm, room 177 Lawrence Hall, U of O
Jim Merkel, founder of the Global Living Project will lead an interactive presentation on living your dreams- while reducing human impact on the Earth. Drawing on such resources as "*Our Ecological Footprint,"* and *"Your Money or Your Life,"* he seeks to bring together the tools necessary to live in harmony with one's values. His lecture will draw upon examples from sustainable living in Kerala India, the Himalayas, and North America. Jim Merkel worked for 12 years as a military engineer before seeing the urgency of the Earth's problems. For the past 6 years he has volunteered his energy towards global sustainability, deep ecology, and world peace.

"The Renewable Energy Fair"
Friday, April 26, 10 am- 5 pm, EMU Courtyard, U of O
The fair will feature exhibits by local renewable energy organizations and a variety of related events, with the expressed goal of bringing new understandings of renewable energy and its applications in architecture and technology to the public. The following is a list of the events that will be taking place during the course of the day:

***"The Global Living Project"*-Brown Bag discussion with Jim Merkel** **206 Lawrence Hall @ 12-1 pm**
An informal and interactive discussion in which issues raised in the prior evening's lecture may be discussed in greater depth.

"NEVCO- Research and Development of Electric Vehicles" **EMU Courtyard @ 1 pm**
A demonstration of the "Alpha" prototype of an electric vehicle scheduled for production this spring. NEVCO is a local company based in Eugene, Oregon.

"Solar Cooker Demonstration Workshop"* -by the Staff of Aprovecho **185 Lawrence Hall @ 3-5 pm**
The Aprovecho Research Center, located in Cottage Grove, OR is known for their dedicated work in the field of appropriate technology. In this workshop, three Aprovecho staff members will teach the design, construction, and use of a variety of solar cooking devices. Registration is limited to 15 particpants—contact the Solar Information Center in advance or sign up at our table during the Renewable Energy Fair.
**This workshop is being held in honor of Harriet Kofalk, a wonderful member of the Eugene community who died recently. Harriet was a solar cooking teacher and advocate, as well a beautiful person who lived and wrote eloquently about such peaceful practices as garden ing and cooking in harmony with the seasons. She wrote several books, including* The Peaceful Cook: More than a Cookbook, Solar Cooking, *and* Angels in my Garden.

"The Way We Build Our Houses- A Case Study of Sustainable Construction"
by Robert Bolman
Thursday, May 9, 7:30 pm, room 177 Lawrence Hall, U of O
Robert Bolman is an artist and contractor who has taken it upon himself to discover alternatives to the "Street of Dreams" housing typology and its related negative social and environmental impacts. His lecture will cover such diverse techniques as cob, straw bale, ceramic, and "Earthship" construction. His experience has been direct and hands on, including many workshops with pioneers such as Michael Reynolds and the Natural Building Colloquium. He is a very active participant in Eugene's chapter of the Eco Building Guild, and is currently in the process of permitting and constructing a strawbale building.
Friday, May 10, Brown Bag, 12 pm, room 206 Lawrence Hall

"Ecological Design: Inventing the Future"- Video
Friday, May 17, 11:30-1 pm, room 206 Lawrence Hall, U of O
A film about integrating nature, technology, and humanity. This film is a product of the Ecological Design Project sponosored by the Ocean Ark Institute and will feature the work of Buckminster Fuller, the Rocky Mountain Institute, Biosphere II, Paolo Soleri, Pliny Fisk, John Todd and many others. Produced in 1994.

Changing Course
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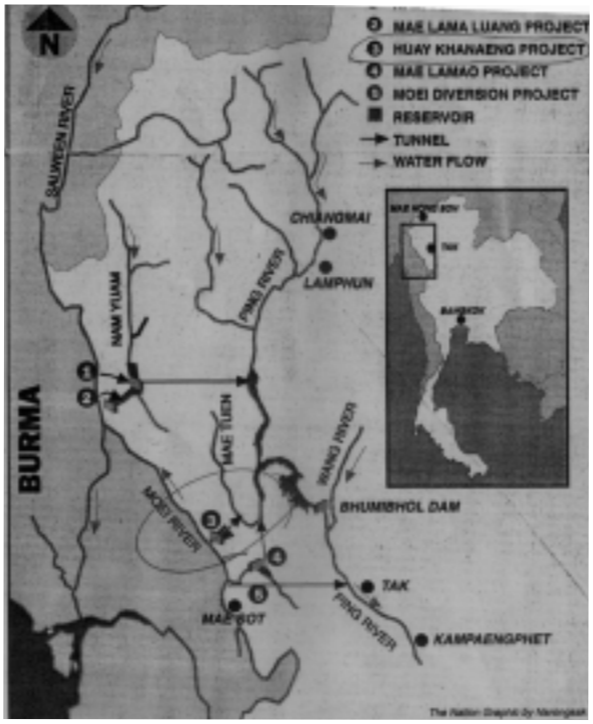
In 1992, the water in the Bhumibhol and Sirikit reservoirs (see photo p. 9), which provide and regulate the water supply in the Chao Phraya basin, reached the lowest level since the two dams were built. Rice farmers and fruit growers in the Chao Phraya basin were asked, as they have been for many years, to refrain from cultivating their crop during the dry season because the Royal Irrigation Department (RID) could not allocate enough water for them. A grim prospect of water rationing in Bangkok was widely publicized.

In 1994, a water crisis still loomed large. The Bangkok Post, a Bangkok-based major English language newspaper, published in its editorial section:

"If you wash your car frequently, if you hose down your porch or water your garden, if you hum a tune while you enjoy a nice, long shower, . . . then you are the problem."
(Drying 1994: 35)



Map showing Thailand's major rivers and reservoirs.

To the Last Drop

Where has all the water gone? According to the RID, reduced rainfall beyond Bhumibhol and Sirikit dams, increased consumption upstream, and rising demand downstream all caused the shortage. The decrease in the amount of rainfall has been much argued and contested. Some academics and members of non-governmental organizations believed that the phenomenon is a simple fluctuation in the weather pattern and cannot be taken as an immediate cause of water scarcity.

A closer look at the demand from the Central Plain reveals an intriguing oversight. While acknowledging the rising demand, the RID never mentions the fact that the Central Plain has been grossly overusing its water resources. With an annual run-off of about 4,000 million cubic meters, the Chao Phraya River is required to serve a demand of 14,000 million cubic meters per year in 1989 (Fundamental 1993). Over 90% of the demand comes from the agricultural sector, which constitutes a major part of the Central region. It is worth noting that a vast expansion of rice farming, including na prang or second-crop farming, in the Chao Phraya basin was an outcome of heavy promotion by the Thai government, which saw a competitive advantage in rice export. One of the major purposes of Bhumibhol and Sirikit dams was to supply water to rice farms in the Chao Phraya basin.

Urban supremacy rules over the management and distribution of water. Clearly, water shortage in Thailand is distorted according to class and location. In some areas or for certain groups of people, water never runs low—or more specifically, is never *allowed* to run low—even in the face of scarcity. During the drought of 1992, for example, the RID's water use plan designated 500 million cubic meters to Bangkok. The remaining 21 provinces in the Central region, which have numerous rice fields and orchards, had to make do with 90 million cubic meters each. The second priority, normally, is pushing back the salt water intrusion and pollution. Whatever remains is for the agricultural sector—formerly known as the quintessential backbone of Thailand. Mr. Anat commented on this issue:

"The Bangkok Metropolis consumes a disproportionately large amount of water that must be taken from the Chao Phraya River and from groundwater at a combined rate approaching one cubic meter per person daily, which is believed to be in excess of the safe limit." (Arbhabhirama 1987)

The difference between water consumption of people in Bangkok and those elsewhere is startling. While a rural Thai person consumes an average of 50 liters per day, a Bangkokian consumes an average of 400 liters per day. Farming requires 2,500 to 16,000 liters per rai (= 0.16 hectares), while a massage parlor in Bangkok uses 200,000 liters of water per day. A large hotel may use up to 1,300,000 liters per day.

The rate of groundwater pumping in the Bangkok area is also dangerously high, overshooting the estimated safe yield by at least 0.5 million per day. (Arbhabhirama 1987). Christensen and Boon-long reported that in 1989, only 0.5% of water consumed by industries located in the Bangkok Metropolitan Region (BMR) was piped in from the Metropolitain Waterworks Authority (MWA). 95% was obtained by groundwater pumping and other sources such as rivers and canals (4.5%). Apart from the fact that the MWA and provincial water-

works authorities fall far short of providing water across the board, ground water is also much more appealing in terms of cost.

". . . the private cost of ground water pumping is very low — about 1 to 2 baht per m3, compared with the average piped water rate of 6 baht per m3; well water is cleaner than water pumped from rivers and canals and does not require costly treatment; and ground water pumping is monitored very poorly by the public sector." (Christensen 1993)

Aquifer depletion leads to land subsidence (5 to 10 centimeters per year in eastern Bangkok). Sinking land gives way to salt water intrusion, which in turn requires that more freshwater be released to push it back.

The demand on water from domestic and industrial use has been growing exponentially. Christensen and Boon-long point out that industrial and urban consumption in the BMR currently stands at about 3 billion cubic meters. Assuming that the Thai economy will grow at an annual average rate of 7 % per year with proportional water use, the researchers predicted that the BMR's demand for water could double in 10 years.

Relying on a more conservative estimate of a 3.4 percent increase in water demand per year, the MWA expects to reach the maximum amount of water that the RID can provide by the year 1997. With this imminent threat, the solution that the RID has in mind is simple: find more water for the Central region. Large-scale dams and interbasin water transfer, including the construction of a series of dams, huge pumps and water tunnels are, from the RID's perspective, inevitable for Thailand's future.

RID's Answer: More Dams

Among dozens of dormant dam projects, the RID is pushing three dam proposals to the front. They are the *Kaeng Sua Ten*, *Pa Sak* and *Haew Narok* dam projects. All of these are old projects of the Electricity Generating Authority of Thailand (EGAT), slightly retouched and handed over to the RID after opposition and criticism against hydro-electric dams mounted.

Kaeng Sua Ten Dam: Planned to be built within Mae Yom National Park in the northern province of Phrae, the Kaeng Sua Ten dam project is part of the more ambitious Kok-Ing-Nan interbasin water transfer scheme. It consists of a series of dams to divert water from the three major rivers in the North to the Chao Phraya basin. The Kaeng Sua Ten dam project is designed to block the Yom River, creating a 1,175-million-cubic-meter reservoir. It will flood more than 4,800 hectares of teak forest, itself a watershed of the Yom River. (see photo p.10). The Kaeng Sua Ten project includes construction of the Mae Wong dam, an affiliated dam which would cause flooding in Mae Wong National Park. The forest is a buffer of the biologically diverse Huay Kha Khaeng forest, a well-known World Heritage site.

Pa Sak Dam: The Pa Sak dam is strongly supported by the highly revered King Bhumibhol of Thailand who said during his birthday speech in 1993 that he would like to see the dam completed before 1999. The dam is believed to require a mass relocation of people. An estimate by RID shows that the cost of land purchases and of compensation to those who might be evicted is five times greater than the construction cost.

Haew Narok Dam: According to the RID, an ideal site for the Haew Narok dam, which has been shelved for decades due to unacceptable effect on the environment, is in the midst of Khao Yai National Park. Khao Yai is the first forest reserve and one of the best-loved national parks in Thailand. It is an important habitat of such endangered species as wild elephants, red gores and several kinds of hornbills. The dam would inundate about 1,600 hectares of this forest.

Said Mr Pramote Maiklad, then RID's Senior Expert on Operation and Maintenance:

"If we can build all these dams, we will have roughly 4,000 million cubic meters of water in store. It will be reserved for use during the dry period in the Cha Phraya basin." (Achakulwisut 1992)

Sirikit Dam, one of the two major prodivers and controllers of water supply in the Central Plain of Thailand. ***Photo by M.L. Thosawan Dhevakul.***

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Interbasin Water Transfer: Salween Basin

In July 1995, Mr. Yingphan Manasikarn, Thailand's newly-appointed Minister of Science, Technology and Environment announced on his inauguration day that national and international water development and diversion projects would be given a high priority in his ministry. He paid special attention to the potential to tap water from the Salween basin in the North.

The vast and last piece of teak forest to be flooded by the proposed Kaeng Sua Ten Dam. ***Photo by M.L. Thosawan Dhevakul***

The Salween River originates in the Tibetan Plateau. It forms part of a Thai-Burmese border and flows down to the Andaman Sea in Moulmein, Burma. Due to an arduous access and internecine wars among several ethnic minorities in Burma, Salween remains one of the least explored and most pristine river basins in Southeast Asia.

China, Burma and Thailand share 42%, 53% and 5% of the Salween River's catchment area respectively. Nantiya Tangwisutijit, a reporter for *The Nation*, a Bangkok-based newspaper, observed that although Thailand holds the least natural rights to the river, it is most aggressive in attempting to exploit the river. The largest projects are the Upper and Lower Salween dams, proposed to be built on mainstream Salween. They have a combined installed hydropower capacity of 5,332 MW. If materialized, it would become the largest dam in Southeast Asia.

Seven projects to divert the water from Salween basin to Bhumibhol reservoir were conceived by the EGAT in 1979. They have been shelved for decades because of environmental concerns. After years of repeated water shortage in the Central region of Thailand, these interbasin water transfer projects were resurrected and adopted by the Department of Energy Development and Promotion (DEDP) in 1992.

The DEDP has commissioned a few groups of companies and independent research agencies to study and assess a variety of potential dam sites and water transfer routes from the Moei River, a major tributary of the Salween River. One of the two routes recommended for further study is the Nam Moei-Mae Song-Bhumibhol reservoir diversion. Of all the diversion plans in Salween and Moei river basins, this project is considered most promising as a long-term solution to the water shortage in Chao Phraya basin. It is planned to divert an average of 2,000 million cubic meters of water annually at a cost of 1.34 baht per cubic meter.

The project would consist of:
-A 1-kilometer long canal from Nam Moei toe Mae Song weir.
-The construction of the Mae Song weir and a pumping station to pump the water up to the reservoir. The water would be pushed to Mae Song Dam #1.
-The construction of Mae Song dam #1. Mae Song pumping station #1 would pump the water up to the reservoir of # 1 and push it to the location of Mae Song dam #2.
-The construction of Mae Song dam #2. Mae Song pumping station #2 would pump the water from reservoir #1 to reservoir #2 and push it to the entrance of a water tunnel.
-A 48.83-kilometer tunnel from Mae Song reservoir #2 to Bhumibhol reservoir. The tunnel would go through mountains and is designed to transport the water by gravity at the highest rate of 100 cubic meter per second.

The other diversion route, from the Moei River to the Huay Khanaeng-Khithue dam and Bhumibhol Reservoir, is recommended by another study team as the most feasible in terms of cost/benefit analysis. DEDP is very interested in this route because it will incur lower cost.

Walakamon reported in *The Nation*:

"For this project, a 1.4-km stretch of the Moei river would be widened. Water would then be pumped through a 540-meter tunnel into Huay Khanaeng reservoir. Water from the reservoir would be pumped through a 15.8-km tunnel into Mae Tuen River which flows into the Bhumibhol Reservoir."

The project is planned to divert an average of 1091 mcm of water annually. Huay Khanaeng-Khithue dam, planned in Tak province's district of Mae Ramat where the Moei River meets Huay Khanaeng River, would be 41 meters high, with a storage capacity of 1.33 mcm. It would inundate part of Mae Ramat National Forest Reserve, a "1A" watershed area. The tunnel would run through mountains. Thailand has not yet been able to provide a safe enough technology in rock-blasting and construction.

According to DEDP officials, the Huay Khanaeng dam would affect only four "Thai" families. Visiting the proposed dam site, however, Walakamon argued that as many as 51 families from Karen communities may potentially be affected by the project. These people were not counted because the authority claimed that the villagers are refugees who are not recognized by Thai or Burmese law. Mr.Chatchawan Sawasdirerk, EGAT's deputy chief of the project was quoted as saying that:

"These Karens illegally occupy the land. There may be no need for use to pay them compensation. But we will find the best solution for them." (Eamwiwatkit 1994)

The cost of the project, projected for 1994, is 8 billion baht, or $US 32 million.

Alternatives

There are about 100,000 leakages in water supply pipes in Bangkok. The MWA loses approximately 30% of its water or 960 million liters per day. At an average consumption of 200 liters per person; that lost water should have been used by 5,000,000 persons. Instead of investing in more large-scale dams, the Thai government might be in a better position if it looked into the unnecessary loss or water and tried to retrieve it.

Continuous campaigns for water conservation must be initiated and seriously conducted both by the public and private sector. Luxurious consumption of water, especially in Bangkok, should not be allowed to continue. This may include allowing the shortage to have a direct effect on urban dwellers.

Conservation campaigns should also be done full-cycle. It would be better if the Thai government were to support production and marketing of water-saving appliances such as washers, toilets, faucets, etc. so that they were more readily available and competitive in the market.

A number of economists proposed that a pricing structure that reflects the real cost of water supply be introduced to correct the distorted agricultural economy. However, removing water subsidy from such poor and underprivileged groups as farmers does not appeal to environmentalists or development activists. Mr. Kevin Kinvig, a researcher working with the Thailand Development Research Institute, was quoted as suggesting that other incentives like loans and investment credits should replace the water subsidy.

It is, in fact, widely believed that Thailand needs a more efficient system of water supply and management more than its needs more dams. Interbasin transfer is likely to displace problems, solving them in one area while creating new ones in another area. A demand-side and more holistic approach that takes into account the rights and responsibilities of people with respect to their watersheds needs to be adopted to cure the problem at its cause. It will be useless to go on building more dams only to find out at the end of the day that there is no water left to fill them●

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The Oregon Country Fair

The Solar Information Center will be returning to Energy Park this summer at the Oregon Country Fair. So look for our newly landscaped Eco-Doll House and other intriguing projects by the Solar Center Staff.

Summer Newsletter

The summer issue of *Solar Incidents* will include the following articles:
Efficient Cook Stoves For Thailand by Atiya Achakulwisut
Masonry Heaters by Jason McLennan
Bank ING by Valerie Wedel
And more!

Solar and Sustainable Showcase

Spring showcase submissions are due June 9th. Be sure and visit the hearth during exam week, June 9-16. The walls will once again be covered with studio design projects that explore sustainability.

CALENDAR

April 1-19
"Sustainable Community Solutions Exhibit"
room 266 Lawrence Hall, open M-F 8 am - 5 pm

Thursday, April 25
"The Global Living Project"
by Jim Merkel
7:30 pm in 177 Lawrence Hall

Friday, April 26
"The Renewable Energy Fair"
10 am - 5 pm in the EMU Courtyard

Thursday, May 9
"The Way We Build Our Houses- A Case Study of Sustainable Architecture."
by Robert Bolman
7:30 pm in 177 Lawrence Hall

Friday, May 10
Brown Bag w/ Robert Bolman
12 - 1pm in 206 Lawrence Hall

Friday, May 17
***"Ecological Design: Inventing the Future"*-Video**
11:30 - 1 pm in 206 Lawrence Hall

S	M	TU	W	TH	F	S
14 **APRIL**	15	16	17	18	19	20
	Sustainable Community Solutions Exhibit					
21 Sun Day	22 Earth Day	23	24	**25**	**26 Energy Fair**	27
28	29	30	1 **MAY**	**2**	**3**	4
5	6	7	8	**9**	10 **Brown Bag**	11
12	13	14	15	16	**17 Video**	18

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