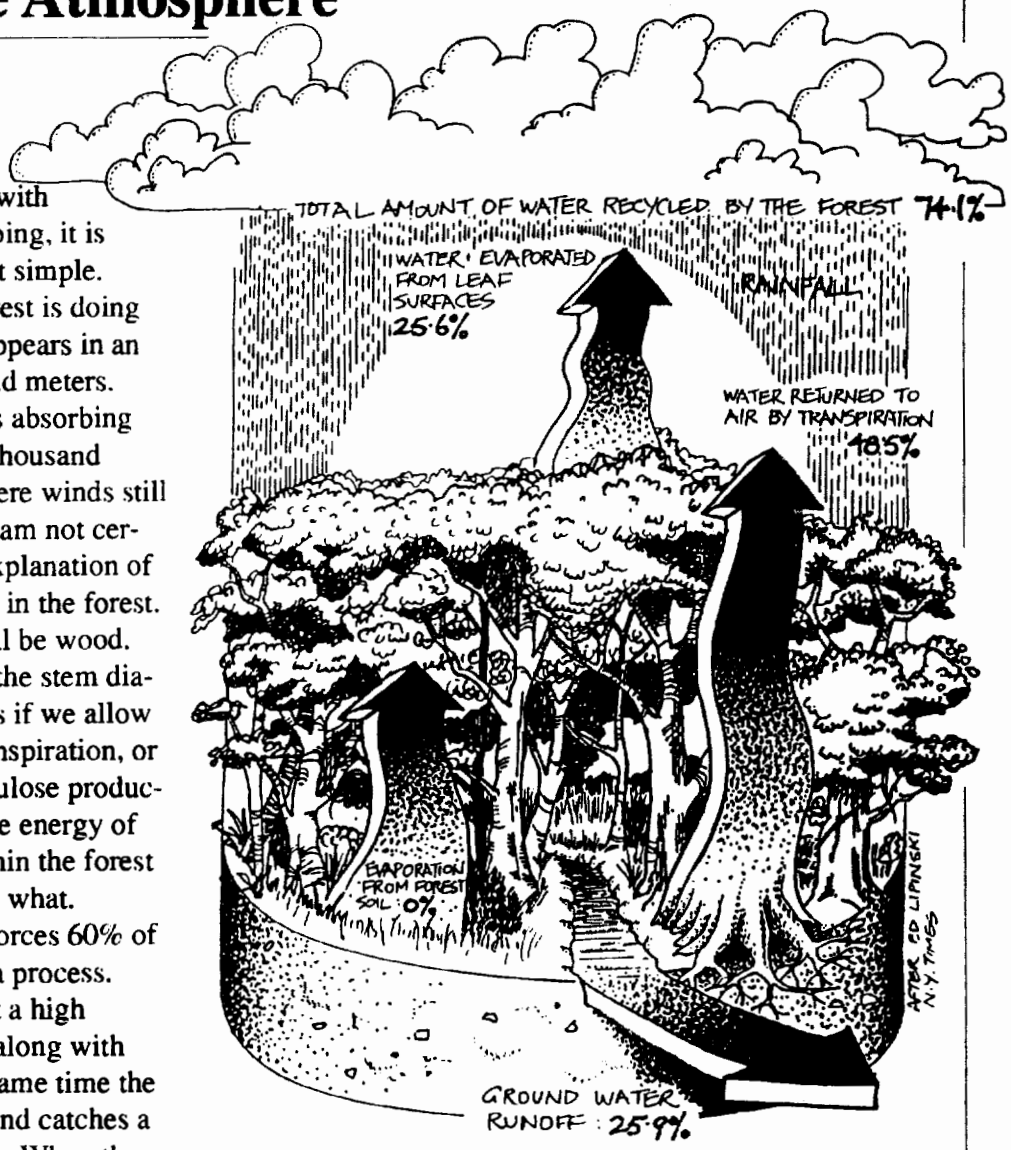
THE
PERMACULTURE ACTIVIST

A Quarterly Voice for the Permaculture Movement in North America

Forests and the Atmosphere

Bill Mollison



I want to discuss briefly what the forest is doing to the atmosphere. I will start off with one statement: Whatever it's doing, it is very, very complicated. It is not simple.

Let's take wind—what the forest is doing to wind. Wind completely disappears in an effective forest within a thousand meters. The forest is swallowing it. It is absorbing even gale force winds within a thousand meters, except at the crown, where winds still continue to have some effect. I am not certain that we have an adequate explanation of what that energy is converted to in the forest. But I do believe it may very well be wood. Because if we anchor the trees, the stem diameter remains constant, whereas if we allow them to move, the wind aids transpiration, or pumping, or cell growth, or cellulose production, or something. Certainly the energy of the wind is being converted within the forest to something; I'm not quite sure what.

The forest intercepting wind forces 60% of the windstream up. That starts a process. When the wind goes up, you get a high pressure on the windward side, along with decreased evaporation. At the same time the face of the forest towards the wind catches a lot more rain than the other side. When the wind goes up, it causes an increase in rainfall of between 15% and 20%. That has been measured in Holland and Sweden. When we cut the forest, the actual rainfall in the region decreases in a set of figures lying between 10% and 30%. So certainly the forests result in greater precipitation.

Then there is a secondary effect. When the wind is forced up by the forest, it goes into sideways spiraling, and that causes belts of rain across the direction of the wind. Little patches of rain go on for several tree lengths past the trees, so that every five tree lengths you get increased rain in a belt transverse to the wind. So you get wet, dry, wet, dry, past tree belts. The descending winds past the forest are warmer, less humid and turbulent, and often cause drying out. It is the opinion of some that it is pressure changes in the air which have the greatest effect on soil moisture. It is a fact that the variation

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FROM THE EDITOR

If the editor's remarks often seem uninspired, I would hazard the guess that it is a direct result of the frenzied ennui which overcomes one after staring at a computer screen for a hundred hours a week, while juggling the delicate work of typesetting in between the regular demands of a full and busy life.

This issue took a look at water—the essential beginning to any design, even the design for a permaculture paper. As by mysterious forces, I have been drawn literally into a locus of water in the course of my work. The final week of composition required a move, computer and all, from the warm but hyperactive Kona coast to the secluded hollow of an ancient volcano, called Wood Valley. Here, all forms of water occur simultaneously and consequentially.--vapour, steam, clouds, mist, fog, dew, rain, springs, pools, creeks, rivulets, waterfalls, floods—even snow and ice are but a scant five miles further up the massive slopes of Mauna Loa. In counterpoise to the neurological and electronic firestorm raging between retinas and fingertips, the now rushing, now languorous sounds of dripping, falling, coursing water have drenched the air around me, its liquid shroud refracting light among a thousand shimmering or sombre shades. Water has literally made possible this improbable work of conceiving, moulding in virtual form and bringing to paper the words you read today.

I hope you will enjoy reading this issue of the Activist and learn as much from it as I have enjoyed and learned by composing it. I had no idea what changes I would be put through in the process of assuming responsibility for the Activist's editing; had I known, I might not have agreed to the task so calmly. But just as Permaculture is growing, so are we all stretching to include more, learn more, and become more.

We have stretched ourselves in these pages to embrace the Permaculture community as it prepares to assume a worldaround role. So our North American mandate, made geographically absurd in Hawaii, becomes the anchor of a trans-Pacific bridge to Australia and Nepal, a trans-cultural bridge between first and third worlds. We invite North Americans to help build that bridge and to travel it with their thoughts, prayers, ideas, journeys, and offerings of every kind.

The paper too is stretched beyond its normal size. We cannot know yet what extra pages will do to the delicate balance of cost and revenue, but it seems now a hopeful sign and one that portends growth in readership and in response as well. If this issue reaches you later than usual, please forgive the urgency of circumstance which gives rise to that lovely phenomenon known locally as 'Hawaiian time'—a very rich and inclusive concept. Binding rather than shearing time, we move slower, but accomplish more.

The Activist depends on its readers and a dedicated and growing core of contributing writers for its very life. Please continue to share with us and with the North American permaculture community your work, your ideas, and news of your locality. We can accept material in almost any form, though we prefer computer files in ASCII or MacWrite format on Macintosh or Atari ST or IBM 3 1/2" disks. Next best are typewritten or neatly legible papers. As you will notice, pictures add dimension. Please send photographs or drawings with your articles. And on the other end, share the Activist with your community and your friends. We will need to add subscribers to continue serving you as we have. The paper makes very little more the cost of producing it. It is and always has been a labor of love. Nothing, however, save anonymity, prevents it from becoming a modestly economic enterprise or even a roaring success. I would certainly appreciate that and will do everything I can to bring it about. I ask your support to help "The Permaculture Activist" reach more readers.

In the future we will explore the evolving place of permaculture as appropriate (that which people may appropriate to themselves) biotechnology--a sane alternative to genetic manipulation and more violence-as-usual towards our precious living home, the earth. We also intend to renew some of the international links which have fallen into neglect during the past few years since the demise of PINA. We will soon be offering the "International Permaculture Journal" by subscription through our agency here in Hawai'i ($20/yr - quarterly). We are also negotiating to bring in and distribute "The Permaculture Edge", PC Nambour's cutting-edge paper, now in its second issue. Watch these pages or contact us at The Permaculture Activist, P.O. Box 3630, Kailua-Kona, HI 96745, (808)322-3294 for further information.

The winter issue of the Activist will address urban permaculture, urban-rural links, and the transition to a world which transcends the city/country dichotomy. Our deadline for notices, articles, and advertisements will be September 25 for the November issue. Let us hear from you.

Peter Bane

A Note from the Publisher

This issue marks the last in which I will have a significant role as editor or publisher. Please, let's not get teary-eyed or anything (though you may send retirement gifts, well wishes and offers for lucrative consulting work to me at the Davis address).

Six years and 21 issues of *The Permaculture Activist* later (plus 1 issue of its predecessor, *The Permacultural Participant* and 1 of the *International Permaculture Journal*), I'd have to say that it's been an exhilarating and enormously educational experience which has given me the tools to continue permaculture work in various arenas. I'm proud of the work we've compiled and hope that it represents an enduring contribution to the permaculture movement. Peter Bane's superb editing job gives me great confidence that I'm leaving the publication to thoroughly competent, professional and evenhanded management.

Though many permaculture concepts are in essence surprisingly simple, the process of effecting change in the real world towards a "permaculture lifestyle" is complex and full of hazards and pitfalls. It is one thing to abandon technological civilization by "living simply" and eliminating the negative impacts (garbage, CO_2 emissions, and other pollutants) of one's own life support, but quite another to create a living example of an integrated permaculture system that is a realistic model for others to emulate.

The published information in the Activist (and a multitude of other sources) goes a long ways to providing the basis for action, but is not action in and of itself. To reforest the earth, preserve the diversity of life, establish community-scale

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Many Thanks, Guy Baldwin

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Cover art: One month prior to publication date.
Feature articles: One month prior to publication date.

Copy and art for the following are due one month before issue date:
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Letters
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For each issue mailed to subscribers, 25¢ is deposited in a Tree Tax Fund maintained by *The Permaculture Activist*.. From time to time these funds are distributed to individuals or groups working in reforestation and forest preservation efforts. Recipients are selected based on need and demonstrated effectiveness in their work. To apply for funds, contact the Editor and include a short description of your project and proposed use of funds. We have approximately $450 available per year.

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Forests and the Atmosphere

Bill Mollison, continued from pg.1

of pressure, the high and low pressure belt, produces higher evaporation, and occasionally a rain shower on the leeward side. But we find it is a real dry place on the leeward side of the forest. The forest has other effects, like reducing the wind, or warming the wind, and so on.

Notice how the forest stops the wind. If you go a thousand feet into the forest I doubt you will experience any wind at all. A tree belt for wind shelter, if it is to be effective, must be about five rows wide, although a single belt of trees at 40% penetrability does have some effect. Passing through a proper tree belt, wind falls off very rapidly within 100 to 200 meters. It drops to a negligible amount. I wouldn't ever trim to the windward side of a tree belt. If you trim, you might create a wind tunnel below the trees, which is a little miserable for animals. The idea of a hedge row is that it comes to the ground, or starts above the stone wall, but in either case leaves no gaps.

Positive Interception

The wind carries dust, and it carries humidity. The forest influences both of these. Without any rain, but on a foggy night, as air moves into it, the forest will, within a hundred meters, reduce the humidity in the air by about 50%. This is called positive interception. I believe this to be a major factor in all coastal forests, and on ridges within fifty miles of the coast. When air coming off the sea is very humid, particularly night air blowing into coastal forests, all you see is a constant dripping of moisture within the forest, even if there is no cloud in the sky.

That same effect can occur in an individual garden. A lady I know, named Marjorie Spear, has a garden with trees in which it rains constantly all night, every night, at times when it doesn't rain anywhere else in the district. Elsewhere there are no trees to intercept this humid air. I think what happens is that the air is relatively warm and the leaves relatively cold. By the time the night wind strikes the trees, their leaves are sensibly cool, and moisture then precipitates rapidly on the myriad leaf surfaces. An individual tree has many acres of leaves.

This same effect isn't occuring in other areas. Moisture doesn't precipitate on grasslands, except as dew. Yet within the forest millions of gallons come down. In Tasmania, up to 60% of our total precipitation is put down to this effect. And 14% of that water falls as rain. 86% is caught on the trees. We are a coastal island, a small island only a couple hundred miles across. But if we put up screens to imitate trees, we can create high precipitation.

When you are cutting trees down, you won't notice the rain gauges falling more than 15%, but you only have 14% of your moisture left. I think positive interception is a critical factor for all coastal mountain ranges, and for the first mountain range inland from the coast. We must remember that forests are pulling a lot of water down out of the air.

Dust and other particles carried into the forest by the wind, are reduced within 100 meters to about a quarter of their previous occurrence in the air mass. This may represent tonnages of particles, particularly if the winds have been travelling across soils and over industrially polluted areas. The forests are entrapping a lot of material, and that leads me to suspect, and a lot of people to state, that there is no shortage of any mineral or any element anywhere, because, in effect, it is all on the move, particularly off seacoasts, and it is being netted by the forests. Now it might be a slow process, and it might be used and fixed as fast as it is netted, but this is really happening.

Conversely, when we come to organic particles—I am talking about pollens, bacteria, and some oil droplets that are being released by the forest—we get a reverse effect. The forests are absorbing tonnages of inorganic materials and releasing tonnages of organic materials. I have read of how the early voyagers sailed towards this continent (N. America) in the spring. At the time there were gigantic white pine forests here. Up to eighty miles out in the Atlantic, the decks of the vessels were coated with pollen, and they thought it was sulphur, and they talked of gigantic sulphurous rains, and the whole sea was yellow with pollen. They thought there were volcanic eruptions ahead of them; they advanced with trepidation towards these shores, into these yellow skies. Imagine the biomass on the move there!

Precipitation

We know that organic particles are far more effective precipitation nuclei than inorganic particles. And we suspect that they are the important factors in atmospheric precipitation. That points to another effect of the forests—they give off organic nuclei upon which raindrops condense. So while forests are taking inorganic particles out of the airstream, and fixing them within the forest system, they are releasing organic particles which go on in the airstream and therefore are available for condensation of rain further inland. About 60% of inland rain falls from forest clouds, not sea clouds.

Let us not deceive ourselves,

clear air contains an awful lot of stuff. Just lying on your back with a good pair of binoculars will persuade you that there is a lot of matter on the move up there. And tying nets through it will persuade you more, and putting up little traps will persuade you even more. There is a lot happening up there. Forests are a big factor.

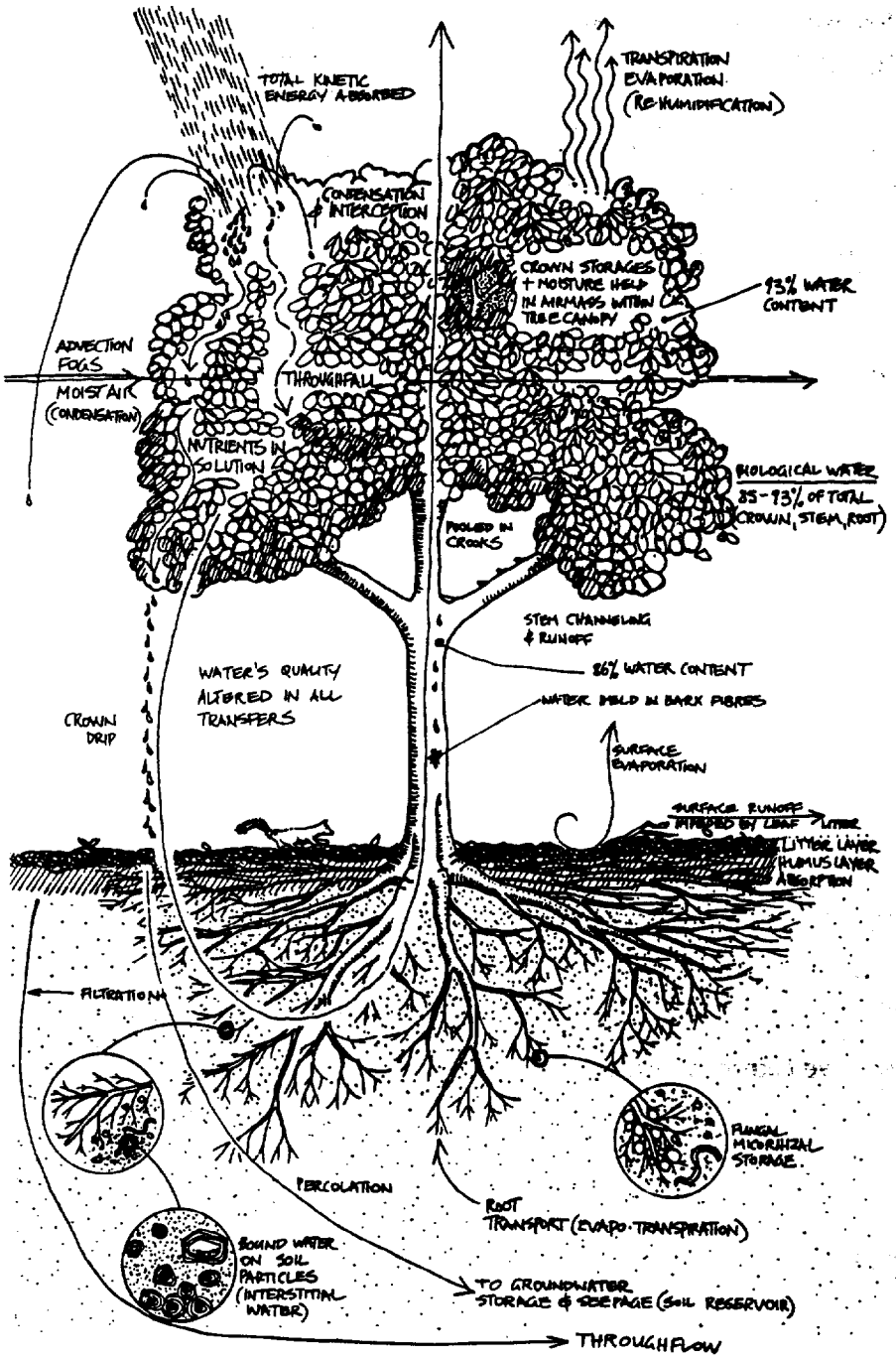
Dispersing and Absorbing

What else is the forest doing? We will move to rainfall. Rain falls on the sea, the land, and the forest. On the sea, it simply cycles back again. I don't know what its effects are. It probably has some effect on surface plankton production. On the land, where it falls on the forests, almost all the mechanical energy of falling rain is absorbed on the canopy. Big energy transactions of all sorts are taking place on the crown of trees. There is frictional slowing; there is impact absorption; the winds are being tangled and stopped; and rain is being evaporated. Within any sizeable forest in leaf, even a violent thunderstorm won't come through as anything but a fine mist. Tons of water and thousands of pounds of kinetic energy are just dissipated in the crown.

These transactions aren't going on very much below the crown; the amount of energy being absorbed and dissipated on the earth's surface is much less under forests. Erosion from pelting rain, which is an enormous force, just doesn't happen within forests. The crown absorbs that energy. If the rain is light, no water at all may reach the ground. It is quite possible for the top of the forest to absorb the total rainfall. That is easily seen in a light rain—under trees the roads are dry. The rain never gets to the ground, but is evaporated off the crown, causing a profound cooling effect.

If it rains modestly or heavily, the crown becomes saturated and water comes down in a whole variety of ways. Some trees funnel water down the bark channels. Ten or twenty times the actual amount of rainfall will run down just around the stem. Other trees pass it down around the crown itself as a circular rainfall. In a mixed forest, rain is coming down every which way —some dripping outward, some running down under the branches, some funneling down the crevices of the trees.

The other thing the forest does



HOW A TREE INTERACTS WITH RAIN

illustration by Andrew Jeeves

to precipitation is that it catches snow and brings it to rest within the forest. I have been in forests when it was snowing, and every tree was intercepting snow in a totally different fashion. There is an interaction between the crystalline structure of snow and the shapes it is encountering.

The difference in melt period between snow outside and inside the forest is quite phenomenal. A forest probably delays melt at least a month. The forest is taking all the winter's precipitation that has accumulated as snow and ice, holding it, and releasing it at a much slower rate over a longer period than would be the case without that forest. It is the same as with rain. But the rain does come on down and enters the soil within hours. If we have just pastures and open ground, that winter snow will melt extremely quickly, and cause sudden flooding.

Water Storage

Let us look at the water stored within the forest. 86% of the mass of that forest is water. 96% of its leaves and twigs are water. Really the forest can be seen as a whole lot of vertical water tanks. That is an enormous weight on the earth. I believe that we can load and unload the crust of the earth in such a way that it will cause earth movements. We know that quite modest dams will cause local earthquakes. But we have failed to see the forest as the enormous mass that, in fact, it is. I think we unloaded a huge weight off continents when we removed our forests. I think we are dealing with more weight here than anybody has ever acknowledged or tried to measure.

Branches will break off trees, either in fierce gales, or at other times on very dead, still, humid nights. When the trees can't transpire, the enormous weight of the leaf water just smashes the branches down. That is the time not to be in the forest—on still, misty nights. With no warning, just bang! crash! big branches fall on those nights. The trees can't support their own water weight, any more than they can support the weight of fruit. Fruit is 96% water.

A forest is also sponging this water up. But not, I feel, only through its roots. A lot of it is entering the tree through the leaves. Leaves absorb directly a tremendous amount of moisture and also substances in solution. It isn't just the roots that are at work taking in nutrient; it is also the leaves. And the leaves, in addition, are manufacturing and passing along nutrients to the tree. So the forest builds a lot of water into its mass.

The rest of the water, not evaporated or absorbed by the leaves, gets down to the ground. Here the litter and humus of the forest floor awaits it; no water is transmitted downward until that is fully charged. There may be six inches to a foot of water held in the forest litter, and nothing moves until it is fully charged. Then the water goes down into the mineral soils below the humus soils. Even down there, every foot of soil will hold an inch of rain. So if you have 30 inches of dirt, then a 30-inch rainfall won't move at all out of that forest situation. Between interception, absorption, the humus absorption, and three feet of dirt, no water moves. Nothing is flowing. Thirty inches is minimal. Sometimes up to sixty inches of rain will be held because we have good deep dirt.

Subsoil Effects

The reason why it percolates so easily is that a lot of it is following old root traces. Forest soils are totally bored out by old roots which have rotted away. These form all sorts of conduits to deeper levels of soils.

Let us look at the soil below the forest. First, the particles absorb all they can. Then water is bonded tightly by surface tension onto each little particle. (Clay, because of its minute particle size, binds water very tightly.) When that has happened, the spaces between the particles, in which this effect doesn't occur, also fill with water, and that water will start to percolate down. The water that was interstitial, not bound, goes on further down and enters shattered rock and what we call deep leads, maybe old buried river beds, and finds its way out into the streams.

As water flows down into this subsoil reservoir, two fates await it. In the first case, the subsoil water can transpire. The trees bring it out of the soil reservoir and into the atmosphere, recharging the air with humidity. That is a very fast effect. Even a modest line of trees up on a desert ridge causes some rain downwind. That is because ground water is being brought up on hot days. Heavy evaporative transpiration is increasing the humidity of the region. When night falls, this may re-precipitate downwind. A huge amount of action is going on there. Water is being flung in all directions. Secondly, the downflowing water is stopped and stored.

Runoff

When the soil reservoir is full and where there is any slope, and there is always slope, some water may start to run off. But on the floor of the forest there is no such thing as a straight run-off system. There are twigs and leaves and debris in immense amounts. If you follow a trickle, it performs some weird convolutions getting through the forest. It meets up

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Living with Catchment

Beverly Winge

With potable water becoming increasingly precious, researchers and planners world-wide are taking a new look at an age-old source—rain on the roof. Harvesting rainwater fits neatly into the permaculture ethic of making the best use of what Mother Nature has to offer.

Our personal experience with a rainwater catchment system began last January when we bought a one-acre farm 2300' up on the rocky south slope of Mauna Loa on the Big Island of Hawai'i, moved into a three-year-old house and began tending the young orchard of 80 trees—avocados, citrus, bananas, and papayas—served by a trickle irrigation system. It was raining then. The orchard was lush and green, the bordering Manuka State Forest was damp, fragrant. Now, after months of drought, the orchard floor rustles in shades of brown, the 'ohi'a forest grows more brittle every day.

In this area where successive layers of lava flow have made the groundwater inaccessible, and the county's well-fed water mains do not reach, catchment is the only option. Every house has its own rainwater system: a non-toxic roof with appropriate gutters and downspouts directed to a cistern big enough, ideally, to store all the water the family will need through the longest expected dry spell. If worse comes to worse, and the tanks run dry, we can buy a tankload of water ($160 for 5,000 gallons) and have it trucked from a town fifteen miles away.

Our enameled sheet metal roof of about 1,000 sq. ft. drains into two cisterns underneath the house, each holding 10,000 gallons. The shallow pitch, basic ridgepole design, and lack of porches or other extensions to the roof have made guttering it a simple matter—one straight section for each half of the roof. The basement cisterns are built of cement block and have polyvinyl liners.

In addition to the roof, our property has a watershed on the ground in the orchard, where a 100' x 20' sheet of polyvinyl has been laid downslope between the rows of avocado trees to provide another 2,000 sq. ft. of catchment. A low earth and stone berm channels runoff into a collection drain, from which PVC pipe carries the water to a 20,000 gallon farm pond. When desired, this water can be diverted, by a simple gate valve, into the house cisterns.

It's a joy to have a pond, even one that's obviously lined with polyvinyl to prevent its contents disappearing into the porous lava rock. Each morning, sunlight bounces off the water and onto the bedroom wall—a light show of expanding circles (mosquito fish breakfasting on larvae), sunbursts (golden tilapia, near-eating-size, flipflopping), and ripple patterns (our new pair of white Muscovy ducks out for an early swim). From the pond we water our vegetable garden nearby, carry water to sustain young tree seedlings, and gather water hyacinth to mulch the garden.

If you're considering rainfall catchment as a primary or as an alternative water supply, there are a few things you should know. The five main elements in designing a system are: (1) the supply of rainfall, (2) the area of catchment, (3) the capacity of the storage tanks, (4) water consumption, and (5) relative placement of the catchment and storage tanks. Only one of these is uncontrollable—the supply of rainfall. You

can expand your catchment area, increase your storage capacity, cut demand by practicing conservation... but just try to make it rain more! (*Ed. note:* See our lead article, "Forests and the Atmosphere".)

You'll need to determine the annual rainfall, frequency, and duration of the longest expected drought. National Weather Service rainfall maps are useful, but not specific enough, and they only deal with annual averages. On the map we are in the "50-inch-belt," but that doesn't tell us much. We were lucky to find a neighbor who's been watching a rain gauge for thirteen years. He has recorded annual rainfall ranging from a low of 28 inches to a high of 69, and a drought one year that lasted seven months! That kind of data is invaluable, because in designing for rainwater catchment, you must provide storage for the longest anticipated dry spell. Ask the old-timers in your area how much it rains and when.

Next, you need to know how much water your family actually uses. Get each person to measure and record his total consumption for a few days; you'll not only get the figures you need, but make your family more water-conscious. The results can be shocking in a household where water is taken for granted. (Some sources say the average American uses 75 gallons per day; right now we're down to ten, and counting.) Don't forget to figure how much outside water you need to maintain your place. For example, drip irrigation for our trees requires 250 gallons a week during the driest part of the year.

Placement of the catchment area is usually dictated by available roof space combined with ease of guttering and drainage. Obviously you want the catchment area at a higher elevation than the cistern. Ideally the cistern might be placed above the level of main water use in order to establish 'head', or water pressure. Our tanks, on the other hand, are under the house where their walls form part of the foundation and they are better protected than a free-standing tank from heat, evaporation, and contamination. If you use your catchment water for irrigation,

you may be able to place the cistern above the area to be irrigated, yet below the main roof level and under the protection of the house or a shed. In any case, most catchment systems require a pump of some sort, but you can reduce the load on the pump and the cost of pumping water by where you collect and where you store water.

Once you have figures for expected rainfall, likely length of drought, and anticipated water usage, you can calculate how big your catchment and storage must be. But before you start, one more important fact: one inch of rain falling on 1,000 sq. ft. of catchment surface will put about 625 gallons into your cistern.

To calculate water requirements: Number of people x daily consumption (gallons per person per day) x longest drought period (days).

To calculate catchment area needed: Water requirements (gals) ÷ 625 x 1,000 ÷ annual rainfall (inches).

Example: 3 (persons) x 30 (gals) x 365 (days) = 32,850 (gals) ÷ 625 x 1,000 ÷ 35 (inches) = 1,500 sq. ft. catchment (approx.).

Plug your own figures into this formula. Note that the example above does not include outdoor water requirements. Then, to calculate required storage capacity (gals), multiply daily requirements (gals) by potential drought (days).

Keep in mind that it's better to be safe (with a great big roof and lots of storage capacity) than to be sorry, and out of water. Houseguests, plumbing leaks and global warming could upset your calculations.

Hawai'i currently does not regulate the construction of rain-catchment systems, but the county building department publishes guidelines to help homeowners build, inspect, and maintain systems.

For catchment roofs, the county

recommends aluminum or galvanized iron sheets, or metal; roofing tiles with steel or aluminum nails and rubber washers. Flashings should be of asphalt tape (with aluminum sheets) or rubber. Paint must be without lead, of course. Gutters should be of aluminum, plastic (PVC), or wood. Storage tanks should be of steel, fiberplastic, redwood, or concrete (with FDA-approved liner). Tank covers should be of steel, fiber-plastic or redwood. Plumbing should be done with galvanized, plastic (PVC) or copper pipe, and any soldered joints should be non-lead.

Lead is the big bugaboo these days. To the east of us, Kilauea volcano has been erupting for nearly eight years now, pouring great quantities of sulfur dioxide into the skies over the island. Consequently, certain areas of the county, ironically, many of the same areas where catchment systems are common, experience acid rain. There has been growing concern over the danger of lead and other heavy metals from nails, flashing, and solder joints leaching into home catchment systems. Because catchment has been a way of life in the drier and more sparsely settled areas of Hawai'i for a long time, many systems were built when lead paint and solder were still commonplace. County officials have urged that existing systems containing any parts of lead be retrofitted with non-lead materials. Paint should be scraped or sanded and covered with two coats of non-leaded paint.

Other good tips to follow:

Avoid asphalt or tar-based roof coatings that ruin the taste of the water. Correct low spots on roofs or in gutters where standing water can stagnate, and clear gutters regularly of debris. Avoid planting trees too close to a catchment area, to minimize bird droppings and leaves. Install a by-pass valve on gutters to reject the first water flow after a long dry spell, or after a periodic roof-scrubbing or a new paint job. (See methods, Mollison, *Permaculture: A Designers' Manual*, p. 166.)

Use smooth-surfaced liners in storage tanks to reduce the growth of bacteria or algae. Screen the tank's water intake with (1) a large mesh for leaves and (2) a finer mesh for smaller debris. Screen all other openings to the tank, and install a rigid, durable, tight-fitting cover to keep out vermin, insects, debris, and sunlight. Install an in-line water filter between the storage tank and the house, and inspect and change it regularly.

Some people treat their water supply each month to control bacteria and algae. The easiest way is to dose it with three ounces of household bleach (6 tablespoons) per 1,000 gallons of water. (Chlorine content can be monitored with an easily-obtainable chlorine test kit.) Other people don't bother unless unusual circumstances prompt them to get their water tested. Boiling, or halozone tablets, can always be used in emergencies.

In a permaculture world, every house could harvest rainfall for

domestic use, instead of piping in water from a distance, or tapping precious groundwater when rainwater is adequate. Catchment is part of a strategy of conserving and using water on your property. Whether that water is used as a supplement to re-establish tree cover, for cropping with trickle irrigation, for ponds or aquaculture, it begins to re-humidify the landscape, halting and reversing the desertification of the earth, expanding the zone where life can flourish. With sufficient catchment and storage, perhaps drought would cease to be a threat.

Beverly Winge serves as Editorial Assistant for the Activist.

Developing a Sustainable World: IPC4

Badri N. Dahal

The Institute for Sustainable Agriculture, Nepal will host the Fourth International Permaculture Conference and Convergence--IPC4 at Kathmandu and Biratnagar in February, 1991.

Pre-Conference News

In response to concern expressed by permaculture people in the USA and Australia about IPC4 fees, I should like to say that the conference and convergence fees are definitely, but not unreasonably, high. The cost is inflated so that fees of third-world nationals can be subsidized, and also to meet the costs of a few speakers who cannot meet all of their own.

The fees are no doubt high compared to what was charged for IPC3 in New Zealand, but the N.Z. conference did not subsidize participants from the third world, except for a few of us with great humiliation. Since IPC4 is being held in Nepal it is important to INSAN to encourage participants from the third world by structuring the fees to subsidize their participation. This will vary from person to person on a sliding scale. I must stress that first world participants, no matter how poor they may be in their respective countries, must be willing to subsidize the participation of third-world nationals.

Building Work Begins

IPC4 fees will not be used to erect the convergence buildings. We have developed a grant proposal to meet the cost of building construction, and work has already begun. Brian Woodward, a lecturer in architecture and an earth-building expert, of Earthways, Wollombi, NSW 2325, Australia, was here with INSAN in March 1990 to initiate planning and construction works at the INSAN PC demonstration farm, site of the 1991 PC Convergence. He left after doing site analysis, briefing a team of local and expatriate designers, and conducting a three-day workshop for local engineers, architects, builders, etc. With the help of the local and expatriate designers' group working presently for INSAN, we have completed our first test structure, which will be used as a staff residence. We plan to erect three more structures of this type within two months if the monsoon does not disturb us. Brian will return to Nepal in October to start up and supervise the construction of the main buildings. Brian is donating his time free to INSAN and the cost of his travel to Nepal (four times) is being met through the AIDAB/NGO Cooperation Programme of the Australian government. The grant application to the Australian government was submitted by Appropriate Technology and Community Environment (APACE), an Australian NGO based in Sydney.

We have planned for all steps and stages of building construction at the convergence site, but so far we have no committed funds. What we have is the confidence to accomplish. The cost of the project is expected to be some US$30,000-40,000. Is anyone aware of donors? Some organizations have already applied for funds on our behalf—among them, the application by DANIDA, Copenhagen, seems most likely to be successful.

Speakers

Fees are not being used to bring so-called big name speakers to the conference. Following guidelines from the N.Z. conference, we are preparing a programme, with a majority of permaculture speakers. (When no first-world PC groups, with the exception of the Danes and a few individuals, are responding to my call for papers for the conference should you expect me to reject the contribution of non-permaculturalists?) We are also attempting to get a balance among the speakers of third- and first-world residents, men and women, and have presentations that cover the whole wide range of permaculture activities. A few well-known people, who have done significant work in environmental protection and repair are being invited to attend the conference (at their own expense) to give their support and help us to gain good publicity. The permaculture organization has been slow to seek publicity. It seems, however, that now is a critical time to seek this publicity and that IPC4 in Nepal will be a good venue from which to do so.

Funding

In the world of funding there are huge amounts of money, billions of dollars, that must be spent. There are also fashions in funding as there are fashions in everything else in the western world. Suddenly the new fashion is sustainable-systems agriculture. Shortly, money will come pouring in to fund it. Where will it go? To groups with strong organizational structures who are competent at image-making and using media, i.e., to groups which are able to

catch the attention of people making funding and policy decisions. Permaculture people have a good record for getting systems on the ground, but unless we rapidly let people know what we have achieved, this funding will go to more visible organizations to reinvent the sustainable systems wheel. For the planet and for permaculture this would be a tragic waste of critical time.

In western countries it is difficult to get access to people in decision-making positions. In Nepal the opening and closing of permaculture courses have been attended by government ministers and officials, heads of aid organizations, aid workers, and ambassadors. These people will also attend the 1991 conference, giving us an unrivalled opportunity to let them know what permaculture is, does, and can do.

It's Time

Probably the most important reason for having Nepal as the venue for IPC4 is the one given by Bill Mollison when he gave his support for this choice at the last conference: that after three conferences in western countries it is time we had one in the developing world, thus giving an opportunity for more than a token number of third-world nationals to attend the conference. It is not often that western people come to developing countries to share information on environmental concerns and solutions. It is very seldom that they give third-world people the opportunity to teach them. Usually western people send their information via experts and the vast majority of western aid money goes back into employing these western experts. One letter from the USA expressed concern that "useful information for the third-world people who do attend should be a priority". Let's remember that participants from the third world can also provide useful information for first world people.

A budget for fundraising for INSAN was circulated by Cynthia Edwards. Based on my experiences with aid agencies in Nepal, if a large budget is presented, they will put in a small amount of money. I do not expect many people to work on fundraising, as it demands time and skill. No one should take the task of fundraising for INSAN and IPC4 as an obligation. Please note, however, that INSAN would like to have registration fees from individuals as soon as possible! Please do not disappoint us by building on hearsay and rumours and talking of nothing but high fees. Instead, people from the first world can provide meaningful inputs to make the conference a grand success.

Recent Events

I'm aware that up to late March, contacts from here have been sparse. I don't want to justify delay, but incidentally, Nepal has just come out of a disturbing, painful, and bloody transition from a monarchial one-party system of government to one which allows (relatively) free speech, and significantly, accountability for actions. It's been frightening to have a gun pointed in your face and sad to see the blood of a peaceful folk spill just because they cry for freedom. So maybe it's not time for people of integrity to exclaim that Permaculture Nepal should go its own way...it's a fragile society and growth can be a risky business when the effects of forty years of perverse conventional development policies are so rampantly apparent.

Nevertheless, the panchayat system has been rent asunder and before us is the opportunity to include Green/Ecology/Permaculture ethics within the government structure as it is rebuilt from the beginning. No other nation has had this chance, though many will, I feel, as they struggle to overcome the dichotomy of economic growth with preservation and production management of the earth (as a being). Here the progression from demonstration farm to bioregion to nation has happened naturally, and I ask what has permaculture got to offer here?

INSAN has embarked on the work of contracting Green Parties worldwide to bring together a manifesto for structuring of a Green third-world constitution, planning, and policy. The signs so far are that it would be most acceptable to the new government here. But we still do this with an office of half a dozen staff!

Please continue your support for IPC4—we're still going for it and need confidence, belief and cooperation from those of you with the insight to see that we are in an important time for all concerned.

(*Ed. note:* Attached to the communication from Badri Dahal was the following recent dispatch.)

STOP PRESS

As a result of the violent anti-government protests of the past months, the single-party panchayat system of government in Nepal has been dissolved and a democratic party system has been accepted by

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Teaching Permaculture in Developing Countries:

A Two-Way Information Exchange

Lea Harrison

Permaculture Services teachers (Max Lindegger and myself) have taught over thirty courses to date. Nearly one-third of these have been held in developing countries and the company is getting an increasing number of requests for further courses there. At present we have requests in hand for courses in India, Indonesia, Nepal, Mali, and Thailand.

There are both similarities and differences between holding design courses in developing and in developed (or should I say over-developed) countries. As always in design courses attitudes play an important part.

The western world is increasingly using AID programs to the third world as a way of providing employment and markets for their own people. Rather than assisting third-world citizens to find solutions to their very real and immediate problems by encouraging the use of local expertise and methods which increase self-reliance, western governments and organizations often promote further dependence on their own programs. Therefore, Permaculture Services follows a policy of teaching in a developing country only in response to a request from someone living in that country. We work there with the aim of training local residents to take over permaculture teaching in that country as soon as possible. Locals can obviously become more effective teachers than any person coming in from outside because of their knowledge of local conditions, species, language, and culture. Longer term, these teachers can also become the trainers for the initial courses requested from neighboring countries.

In addition, teaching programs run as part of overseas aid are all too frequently seen as information given by the first to the third world—a one-way process. However, following permaculture design principles, we know that it is only energy cycles that are sustainable. Here the energy is information and I feel we must look at our courses in developing countries as a way of exchanging information—that we go not as western "experts", but as global citizens concerned about what we see happening to our world: to share the solutions, strategies, and techniques that we have found for protecting and repairing our environment and asking the people we are with to share their knowledge with us.

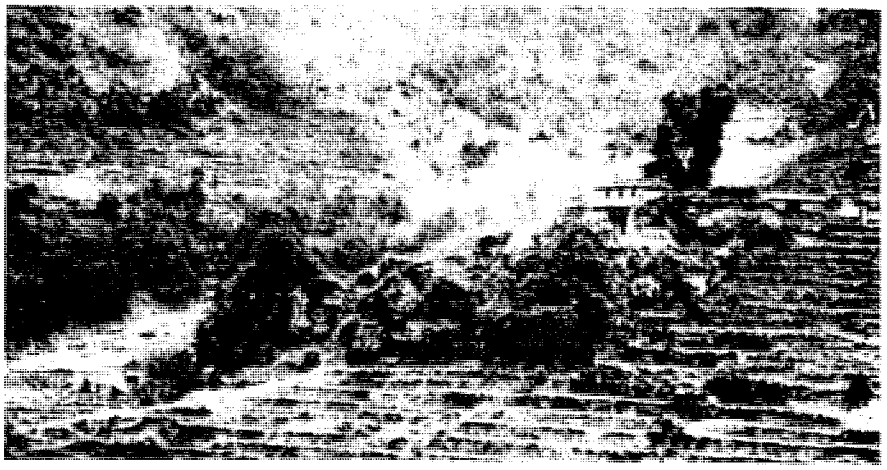
Something else of great importance that we can exchange is success stories that can inform, inspire, and motivate people. It is the belief that we, as ordinary individuals, can be effective in changing our environment that will ultimately overcome the fear, greed, ignorance, and apathy that is destroying our beautiful and marvellous earth. Knowing of the success of other individuals causes more individuals to take action.

I find the permaculture law, "Everything works both ways.", applies here also. As a course teacher I must examine my attitudes, but participants need to do this as well. Participants often expect specific 'how to's' using local examples. In time I can provide more of these; initially in a new country, I will have very

few. What I can tell them are the 'whys'—for example, why we need to plant windbreaks (to increase the number of trees locally and thus maintain the water vapour cycle and atmospheric balance, to provide climate modification, pest predator and wildlife habitat, etc.), but not what local species to use, how these are propagated, or how they perform.

In any country where I don't yet have specific local examples some one will say, "I can see how that works in Tyalgum/Tasmania/etc. (from where I have slides or videos as 'proof'), but it won't work here in Paris/Naryangat/etc!" When participants make an attitude shift to how can we, with our local knowledge, apply this idea from abroad to our local situations, they often come up with creative and sometimes inspiring solutions.

Although I use the same teaching skills in all countries, standard techniques gain different emphasis in other cultures. This then opens new applications for those skills in the countries where they were used initially. That is, it is a process of constant change and improvement because of the great diversity that different cultures provide. For example, years ago now I found myself trying to mould a two-dimensional blackboard into a three-dimensional landscape to explain keyline water systems. So we moved outside into a heap of sand and keyline suddenly became startlingly simple. This became a standard teaching tool for me and a session that was usually popular with the participants, particularly with the addition of a hose to make 'rain'.



Years later, teaching in Nepal, I saw myself struggling to bridge the gap caused by language and accents, and found the answer in using that pile of sand every day, not just when we talked about water systems. It expanded further with, "In my village we have this problem...," and a participant's hands started moulding the sand to produce a local landscape we could all see.

Anywhere language and accents cause difficulty in understanding, demonstration sites are of the highest importance. As the Chinese proverb says, "One good look is worth a thousand words!" Useful demonstration sites, however, come not only from the intentional effort of permaculture people, but can also be the result of common sense, traditional farming skills, and a love of nature applied by a local farmer or gardener who may never have heard of sustainable agriculture. In each new area I scan my surroundings for these green, diverse spots that pop out of the landscape. They often become the most effective teaching tools in that course, and may be shown as slides on subsequent courses I teach in other corners of the globe.

Courses in the developed world are easily self-funded by people attending. This is usually not the case in developing countries. Often we have a request for a course from within the country and a teacher willing to go, but are delayed or blocked from scheduling the course by a lack of funding, even when we cut teaching fees down to minimal amounts. This is particularly true for women's courses, which are of a high priority, as many third-world farmers are women, while most agricultural advisors are men and cultural constraints generally prevent them from associating.

Funding is also necessary for effective follow-up after courses. Participants need continuing information exchange and other resources: subscriptions to journals, possibly their own newsletter, resource books, seed and plant materials and small tools. Also it is essential for the future that we be able to include people from developing countries in an apprenticeship program.

Lea Harrison lives in New South Wales, Australia. She is co-director, with Bill Mollison, of the Permaculture Institute.

Field Notes from Jajarkot

Chris Evans

"....where the working permaculture demonstration farms spring amazingly naturally to life."

JAJARKOT, NEPAL. Established in May '88, Jajarkot farm on its paltry acre of divided land quickly reached production in vegetables, spices, and mulch material (which would be fodder if it wasn't for the lack of livestock). By November last year firewood had just come on line from thinnings of tree plantations and management of the various live fences around the property. Fruit trees have been established and are constantly being added to, and significant site amelioration is evident. Indicative of this is our newly found ability in several areas, to control the amount of light reaching the floor as well as protect from drying wind, by managed lopping of *Leucaena* and other pioneer-type trees.

The farm has no permanent water source, and so relies on the following strategies: mulching (green and otherwise), use of semi-arid species and wet-season-only cropping (Je.-Sept.), and use of permanent crops requiring only good establishment. While there are still lots of corners, nooks, and crannies left for planting, the farm has run out of space for its major planned developments: a commercial fruit nursery (plus multi-purpose seedlings for distribution), livestock pens, and a biogas plant. Bees are living happily in hives once brought from Kathmandu. Now the hives also are made on-site.

With establishment well underway, policy at the farm turns to its secondary objective of outreach into the villages of the district. And like any good mother, the farm (now #1) has spawned sites between one and three days walk from the district centre. Small projects are being instigated in four sites, with fringe activities also warming up among friends, contacts, and anyone else who wants to try, to the extent of the farm's resources.

Then Mother dropped a huge sibling—another acre of land was bought one hour's walk from farm #1 in an area of paddy where we had been trying out some of Fukuoka-san's rice despite animal encroachment and lack of clover. Now this site is 'officially' earmarked for complete design and establishment of farm #2—room for a house, nursery, biogas et al. A river runs by which is ripe for management of level and flow, and also aquaculture.

K. B. Regmi, formerly a Junior Technical Assistant (JTA) for nine years in the Agriculture Development Office (ADO) in Jajarkot, is now manager of farm #1. He quit his job at the ADO following the grant of a three-year sponsorship from a U.K. charity for wages, as well as establishment costs for #1. We now seek funds to cover some of the costs of #2 which should be cheaper (about £1200).

SURKHET. Another one of Jajarkot #1's babies, a new 1½ hectare site, has been rented on a three-year contract, 2½ hour's walk south of Jajarkot, located on a new road linking it to Nepalgunj in the West (and thus with India) and the Mahendra East-West Highway. Work has commenced on nursery establishment and fencing. Training will begin soon in horticulture and beekeeping, and the farm will start to demonstrate rolling permaculture techniques whereby intercropping, use of waste land, green manuring, windbreaks, bunding, improved seed selection, etc. will be introduced without reducing production of conventional crops, while gradually enhancing yields.

BIRATNAGAR. Work has begun in earnest to establish a 7 ha. site purchased by INSAN at Sunsari near Biratnagar. Formerly a sugar cane plantation/rice area, the soil has become quite poor and prelimary priorities are to restore fertility, while establishing fencing, a nursery, fruit plantation, vegetable production, and trials for green manure/legumes, etc. One technician is overseeing the site (Rita Shrestha) with Prasad Chetri as chief designer.

This site will host the Permaculture Convergence preceeding IPC4 in February '91, so speedy establishment of site amelioration systems are underway in order to give participants a pleasant environment to work and play in, as well as good food to eat.

KATHMANDU. At last a site for a demonstration farm in The Valley has been found in Sita Pahila Village Panchayat, outside

of the Ring Road at Swayambhunath in West Kathmandu. A half-hectare of land, steep slopes, paddy fields, and a river running along a boundary, offers an excellent opportunity to demonstrate many aspects of a permaculture development: water conservation (bunds, tanks, dryland crops, etc.), water use (shade-/moist-loving crops, irrigation, biological water filtration, etc.), no/minimum tillage systems, intercropping, windbreaks, sun traps, etc.—it's all there waiting to be designed. INSAN hopes to run its future training courses there (next one in April) once facilities are developed. The farm also hopes to start its outreach program here with a community plantation (no pines or eucalyptus assured) nearby as well as distributing fruit/fodder seedlings.

Other Projects Pending

DHANKUTA: Following attendance of Lea Harrison's Rampur design course (Sept. '89), Utterpani Agricultural Technical School principal Mr. Dube has invited INSAN to carry out design work on part of the 40 ha. site at Hile, Dhankuta. Apart from improving food, fuel, fodder sustainability, site amelioration, and development of aquaculture systems around the administrative quarters on the site, INSAN also hopes to establish a traditional model farm on ½ ha. plot to demonstrate introduction of PC systems to traditional village practice—the integrated small holding.

JAJARKOT. Development of the current demonstration farm since June '88 (see earlier) is set to evolve into a village-scale design program. In fact, why stop there, this can be a BIO-REGIONAL design approach which is an exciting prospect though we still need some inputs from more experienced designers overseas for this one (anyone listening out there?) INSAN also has the opportunity for access to land in Solukhumbu district, a large tract of land between 1000 m. and 4000 m. with a border on the Everest trek.

The concept of being able to design sustainable agriculture and energy systems for whole villages is a natural progression from the demonstration farm model. As sites become available, INSAN finds itself in search not only of sponsors to support evaluation, design, and implementation, but also the skills and information resources to be able to do so. As such it also seeks support for training programs which can take its graduates overseas, or to bring trainers and designers here to Nepal. Any how *kam chalou*...but any offers? To be able to re-establish whole settlements knowing they are in harmony with the environment, as well as providing a self-determined supply of basic needs and means for income generation (fruit, food processing, etc.) is surely the ultimate aim if Nepal really seeks peace and development, as stated so frequently by His Majesty's Government.

Design Course participants study working examples of permaculture principles at M.C. and Ooma Pereira's farm in Chitwan, Nepal. *photo by Lea Harrison*

Chris Evans serves on the staff of The Institute for Sustainable Agriculture, Nepal. His report of happenings at the field stations originally appeared in the "INSAN Newsletter", *Fall/Winter 1989.*

Sweet Potato Culture

Terance M. Devine

The symbiosis between man and Sweet potatoes is age old. The Sweet potato germplasm was wide spread throughout western South America and the tropical and subtropical Pacific from Peru to New Guinea and Hawai'i to New Zealand well before European contact with the area. This distribution of the plant contributed to theories of an east-to-west migration of man in the Pacific expounded primarily by Thor Heyerdahl. It is not certain, however, whether Amerindians brought it to Polynesia or vice versa. Some believe that the species originated in Africa and was carried both east and west.[1] Not withstanding its origin, the close similarity of historical aboriginal names of the Sweet potato gives credence to the rapid pre-contact spread of the species (South America - *Kumar* , New Zealand - *Kumara* , Tahiti - *'umara* , Hawai'i - *'uala* , etc...).

The Sweet potato (*Ipomoea Batatas*) is a member of the Morning Glory family (*Convolvulaceae*) and grows as a vine sprawling close to the ground. It produces large edible tuberous roots from nodes along the stem beneath the center of the plant.[1] The leaf shape varies from heart shape to deeply lobed to palmate with 5-7 points. The pinkish-lavender flowers are tubular at the base, with a widely flaring corolla. The skin and flesh of the tuberous roots vary widely in color, from white to red to orange to purple. Orange-colored roots are often marketed under the label "yam". This is a botanical error, the true yam being another plant altogether. The yam (*Dioscorea Alata*) belongs to the family *Dioscoreaceae* and is a climbing vine with stems slightly angular in cross section and heart-shaped leaves the veins of which join at the apex.

Sweet potatoes can be grown anywhere that has about four months free of frost. Propagation is mainly by stem tip cuttings. However, the morning-glory-like flowers will sometimes set viable seed. Cuttings are usually taken from existing plants, but they can be grown from stored potatoes that have been overwintered (Cure tubers for two weeks after harvest in a hot, dry place and store them, individually wrapped in newspaper in a warm, dry, well-ventilated spot, protected from rodents.) merely by sprouting the tubers like avocado pits, suspended in a jar of water or dilute nutrient solution and kept warm (24° - 32° C.). Cuttings for planting should be at least 6" - 9" long with no more than 2-3 leaves left below the terminal bud. Cuttings taken from existing plantings can be rooted in a rooting medium or in plain water. They should show some root growth prior to planting.

Bed preparation is fairly simple. Sweet potatoes demand little nitrogen. It's a great crop to rest the soil between givers and heavy feeders in a standard garden rotation. Lots of organic matter is a must in the form of compost or turned-under cover crop. The soil should be fairly loose and free of rocks. The plants can take it acid, but not much below pH 5.0; 5.0-6.0 is a good range.[3]

When planted 6" deep in low flat-topped mounds at 8" - 12" intervals, the vines have room to set up a green mulch canopy. When this has grown in thick and the vines trail over the sides of the mound, toss them up onto the surface of the mound. The soil should then be heaped up over the trailing vines on top of the mound. Thus done, the plants' energy is concentrated to produce tubers on the main stem rather than on the running vines. If cuttings are planted each in separate mounds, trailing vines can be coiled around the mounds with the soil heaped up

photos by Peter Bane

on to the loose ends to get the same results. Water demand is important early on, but once the vines set up a green canopy they are very drought tolerant.

There are many cultivars; the plant itself is very plastic and mutates rapidly. The ancient Hawaiians, for example, cultivated over 150 different varieties.[4] It is very possible for a gardener, working from parent stock, to develop a cultivar suited to his or her locale, considering the plasticity of the germplasm.

Harvestable roots can be had within three months for some varieties and four for most. It's easy to tell when they are ready, just poke around in the mound to feel for the sizable tubers. Small potatoes can be harvested to let larger ones fill out faster. In cooler climates storage of tubers is similar to that of Solanum species tubers. If you are in a warmer area, they can just be left in the ground until ready to use. However, if it gets too wet, they should be harvested, dried, and stored.

As far as pests are concerned, cutworms and stem borers can be a problem with the plants and tubers. Changing the growing location from crop to crop can adequately control pest insects. Maintenance of a healthy predator/prey environment is important. Weeds are a consideration until the vines form an adequate canopy, usually in 2-3 weeks.

Nothing beats fresh baked or steamed Sweet potatoes. The tender tips of the vine make great potherbs as well. The old vines are an excellent hog feed amendment (Ed. note, Rabbits seem to relish them too.) with a top off of old potatoes for fattening.[4] The vines should be thoroughly dried or burned before turning under or composting. Traditionally, at least in Hawai'i, the latex from raw tubers was used as a stomachic and expectorant, and the plant itself was held in high esteem ceremonially in many Pacific cultures.[4]

Other than minor weeding until the canopy is established, and periodically tossing the trailing vines up onto the mounds and "hilling up", Sweet potatoes are a relatively maintenance-free source of excellent food and fodder value with an incredible amount of genetic diversity.

[1] "Sweet Potato," Na lima kokua, Pacific Tropical Botanical Garden, 1983, P.O. Box 340, Lawai, Kauai, HI 96765.
[2] *The Seed Starter's Handbook* , Nancy Bubel, Rodale Press, 1978.
[3] "Sweet Potatoes", College of Tropical Agriculture and Human Resources, Univ. of Hawai'i-Manoa, Honolulu, HI 96822.
[4] *The Hawaiian Planter* , Vol. 1, E. S. C. Handy, B. P. Bishop Museum Bulletin #161, 1940, Honolulu, HI. (Kraus Reprint, Millwood, NY, 1985.)

Terry Devine raises Sweet potato, taro, and poultry on a small forest farm above Keauhou on the island of Hawai'i where he lives with his wife, Elise, and their three children. This is his first article for "The Permaculture Activist".

Rainwater Collection from Roofs

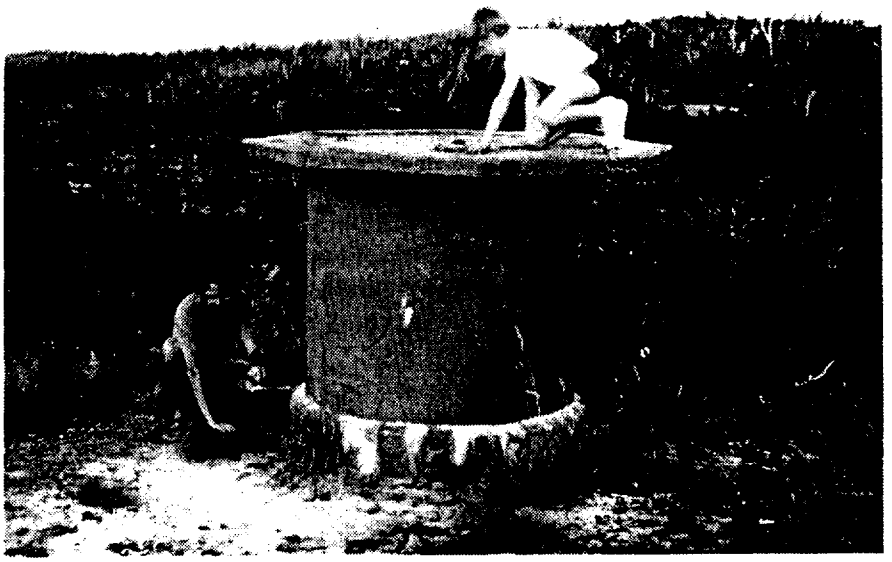
Guy Baldwin

Many people in the U.S. express distaste over the thought of actually drinking water that has been collected from the roof. Immediate reactions vary from "what kind of chemicals do you get from the roofing material?" to "what about bird droppings, dead bugs and leaves?".

An Australian visiting this country might well express the opposite reaction, surprise that people here actually drink water from the ground. This reaction is understandable when you consider how much we dump on the land in the way of pesticides, herbicides, toxic wastes, animal wastes, and human wastes from septic drain fields and sewage treatement systems. We are defecating in our water supplies, yet we wonder if rainwater is safe to drink. Still, groundwater remains the source of drinking water for most Americans, despite containing inherently more dissolved salts than rainwater- iron, magnesium, aluminum, nitrates, and heavy metal salts.

Worries over chemicals in rooftop water from asphalt, shingles, composition tile, or corrugated sheet metal may have some basis in fact, especially in areas where rain is highly acidic, yet when compared to the contaminants now found in many ground and surface water sources, rooftop water may be the safest available, and it is certainly a viable, low-cost alternative for self-reliance. From personal experience, the water I drank from roof catchment tanks in Australia tasted good. There was no need for fancy filtration and no need for water softeners to buffer the impact of "hard" water.

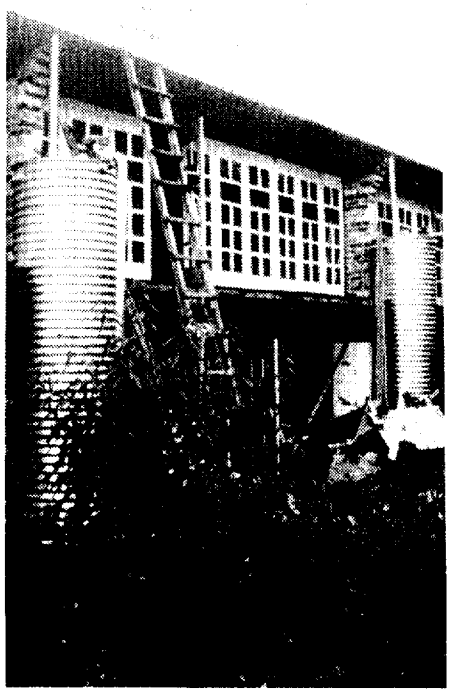
Australia is a relatively dry place. Most of the population lives in areas which receive 10" - 30" of rainfall annually, yet we found roof water was the primary source for drinking water and other household usage in a large percentage of homes in all areas we visited, from Queensland to South Australia to Tasmania.



In wetter areas fewer tanks are needed to store enough water. In dry areas rural homes are often surrounded by a hodgepodge of 55-gal drums, underground cisterns, small, medium, and large (50 - 50,000 gal.) tanks of wood, ferrocement, or corrugated iron. Even in urban areas some residents choose to install rainfall collection and storage systems rather than rely on municipal water supplies for drinking water.

One innovative system I saw serves as the sole supply for a small youth hostel in New South Wales. Two 2000 gal. tanks caught water from half of the roof. (A lot of piping would have been needed to collect water from the other half.) Gravity flow from the tanks supplied the kitchen, cold shower, toilets, and washroom sinks. The largest water user—the shower—was hooked into a simple cut-off system (see photo). Whenever the water level in the tank dropped below half-full, the shower ceased working, thus immediately putting water conservation measures into effect until the next rain.

It is advisable to have two outlet pipes on any water tank (whether filled with roof water or from any other supply), one at the bottom (to drain the tank for maintenance), and one located at about half volume. The higher outlet will be used most of the time; if



the tank springs a leak, or if there is a prolonged drought or other problem with supply, then a reserve supply remains available after the first tap runs dry.

Various methods of filtration can be used to keep roof debris from flushing into the tanks, and to keep mosquitos and other insects from getting into the stored water. Simple systems exist to allow the first 50 or 100 gallons from a rainstorm to flush the drain pipes out, allowing only clean water into the tanks. Chemicals are rarely needed to keep the water clean.

In comparing the cost of construction of rooftop water storage to conventional systems, there are many instances where a roof runoff system will be much less expensive. Collection facilities (rain gutters, which many homes already have, plus plumbing) are a relatively minor cost, and should be designed into new structures as a matter of course. Tanks come in a variety of sizes and types and need to be sized according to water needs and climatic conditions. Ferrocement tanks can be constructed on site at low cost, and will be valuable whatever water supply system is used.

For many rural homesites, the conventional water supply system is a well and a submersible electric pump (unless you are lucky enough to have a safe, dependable source of surface water at a higher elevation than your house). The cost of putting in the well, pump, and power can be astronomical. Typical well installation costs are $20/ft (200-foot wells are not uncommon), utility power can be brought in ($11/ft from existing power lines in our area), or electricity supplied by photovoltaic panels ($1000-$2000 for pump, panels and tracker unit). A well designed (i.e., expensive) submersible pump will last a long time (5 - 15 years), but they are mechanical devices and they wear out eventually. So do rain gutters, but they're a lot cheaper and last longer.

As a rough example to demonstrate the feasibility of a roof-top system for drinking water supply let's consider the needs of a family of four in an area which typically has seven months with no rainfall. During the rainy season, the tank will fill up with each rain, so the critical period of time is the dry season. We'll estimate water use at 5 gallons per person per day (enough for drinking, cooking, cleaning, and a short shower every couple of days). How big does the tank need to be?

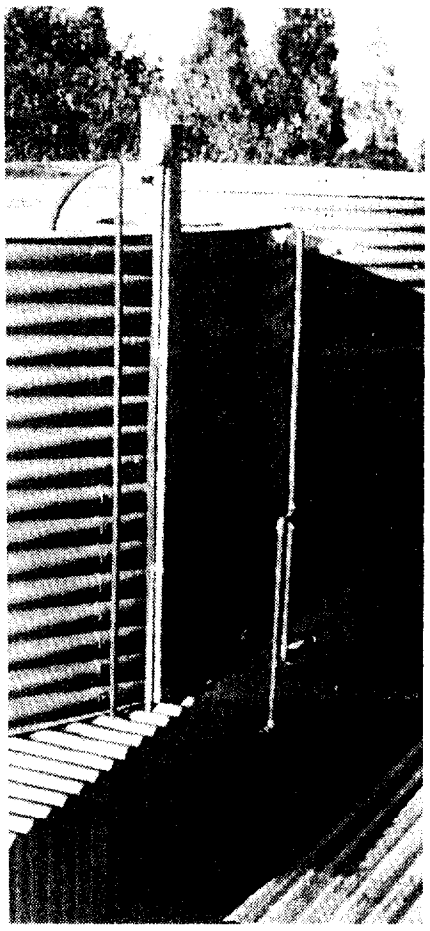
Total water use for 7 months:
7 mo. x 30 days/mo. x 5 gals/person/day x 4 persons =
4200 gallons

So, we need a 5000 gallon tank (or larger to be on the safe side).

Remember, we are talking about household water. If you are trying to collect enough for garden irrigation, you'd better build a small pond, or a very big tank, and collect water from a larger catchment than just the roof of the house.

Assuming a 2000 square-foot roof (house plus garage or shed), how many inches of rain will be needed to fill the tank?

5000 gals. ÷ 7.5 gal/ft^3 = 666 ft^3
666 ft^3 ÷ 2000 ft^2 x 12 in/ft =
4 inches



Thus, even in a dry climate enough water can be collected from a moderately sized roof to fill a tank to last seven months. If any rain at all falls during this drought period, the tank will get a boost and there will be a greater safety margin. In drier climates, storage tanks must be sized larger to get through the dry season, and will have to store a larger percentage of the total annual run-off. Another alternative is to expand the collection area by collecting run-off from the barn roof, or a paved area, or a large rock or hard surface.

Resources:

1. Ferrocement Water Tanks and their Construction , S. B. Watt, Intermediate Technology Development Group, 1978.
2. More Water for Arid Lands , National Academy of Sciences, 1974. Collection, storage, use, reuse, and conservation of water for domestic, garden and large-scale irrigation.
3. The Owner Built Homestead , (Barbara & Ken Kern),
4. The Owner Built Home , and
5. The Owner Built Home Revisited , Ken Kern. All cover use of thin-wall "slip form" for construction of cement tanks and other structures.
6. "Real Goods News", catalog for Real Goods Trading Company, 966 Mazzoni St, Ukiah, CA 95482. Carries water purification systems, 12 Volt pumps and photovoltaic panels, trackers, water tanks.

1, 2, 3, and 4 are available from Permaculture Communications, PO Box 101, Davis, CA 95617 (see ad in this issue).

5 is available from: Owner Builder Pulbications, PO Box 817, North Fork, CA 93643. $15.00 + Shipping and Handling.

Book Reviews

Guy Baldwin

PONDS--Planning, Design, Construction
Soil Conservation Service, USDA Agriculture Handbook No. 590.

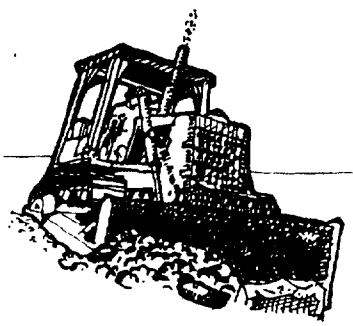
DESIGN AND CONSTRUCTION OF SMALL EARTH DAMS
K. D. Nelson, Inkata Press, Melbourne, Australia.

Available from Boffins Bookshop, GPO Box 23084, Perth, Western Australia, 6001 for A$19.95. Send US$25 travelers checks or cash only, personal checks don't work.

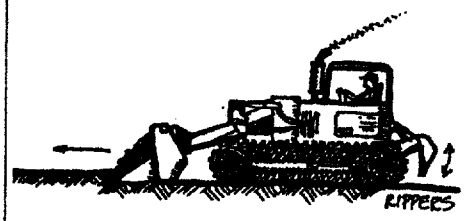
My interest in water, dams, earthworks, ditches, and the like goes back to my early days of serious mud-pie making and other fun that can be had by a youngster with a hose and continuous water supply. I soon progressed to piling rocks and mud in creeks to form dams. Recently I've graduated to designing dams, ponds, and irrigation ditches for our own farm and for the Keyline Demonstration Project, and hope to begin construction of a 2.5 acre-foot pond (800,000 gallons or 3,000 m3) in the fall. Needless to say, the complexity of the undertaking increases dramatically with scale.

The permaculture books (*Permaculture I, Permaculture II,* and *Permaculture, A Designers'* Manual) provide much useful information on pond siting and design and how to achieve multiple functions— microclimate modification, food supply, water supply, and habitat. Many details are included on shaping the shoreline and bottom to create islands, "perched" ponds, maximum edge effect for fish and wildlife habitat, and protection from grazing animals.

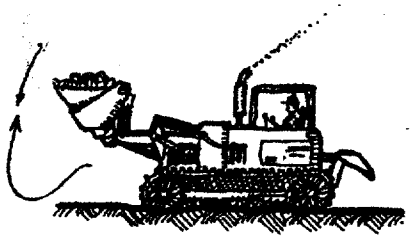
For further information, I highly recommend *Water for Every Farm* by P.A. Yeomans, (from whom Mollison gleaned much information on water management in the landscape for his books). Yeomans will give you a handle on how to calculate the amount of water needed for irrigating by the Keyline system. He also reviews different types of ditches, irrigation, and water control systems. However, if you really want to go out and build a pond, you need to know how to survey the site,determine quantities of earth fill, and estimate the cost of construction.



(*Ed. note:* As Yeomans points out, the earthmoving technique can make a lot of difference in the cost of building a dam or a pond.)

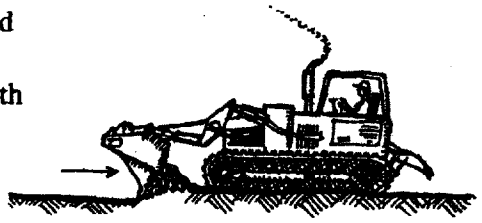


Taken together, these two publications will give a thorough introduction to the art and science of building small dams. Provided the dam being planned is small, (the definition of small varies with the site, and with state and local laws) you may find these two references will provide enough information to get you well into design and construction of your



dam. Nelson's book is considerably more thorough and complete, but he gives measurements in metric units. The USDA publication is usually free if you can find it at the local County Co-op Extension office or through your Resource Conservation District (Soil Conservation Service). Their handbook #590 provides simple formulas to determine volume of earth fill and peak storm run-off, and also offers diagrams for spillways and outlet pipes.

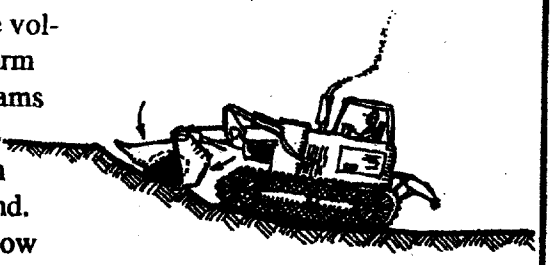
Nelson describes small dam building from beginning to end. He covers runoff and flood-flow volumes, types of dams, site investigations, soil classifications, earthwork volume and storage capacity, sizing and design of spillways, outlet pipes and trickle tubes, various earth berm designs, construction processes, maintenance, and reservoir safety. The writing may be a little "dry" but if you want your dam to hold water this book will help. Lots of examples and practical experiences are included. You'd also be



well advised to ask around for more information, talk to equipment operators, the Soil Conservation Service, neighbors who've built ponds, and by all means, if a water-rights permit is required, get one before you start construction.

Guy Baldwin is the owner operator of Permaculture Communications and manages the Keyline Demonstration Project—a 100-acre demonstration of Keyline soil fertility enhancement on dryland and irrigated pasture. He is available for permaculture and Keyline design consulting.

Guy Baldwin
Keyline Demonstration Project
1893 Pleasant Grove Ln.
Marysville, CA 95901



Forests and the Atmosphere

cont'd from page 6.

with fallen logs, trunks, and leaves that are banking up and turning it again. These impedances keep on halting the water, and its time on landscape is great

Run-off is very slow in forests as compared with out in the open, where it just goes whist! In the forest it is impeded and impeded and impeded. In the open, the water runs off, and the rivers rise. If you want to increase run-off into catchment, cut the forest, and for a very short term your reservoir fills quicker with every rain. So the engineers reason, "Let's cut the forest to increase the runoff." What they actually do is diminish the rainfall, drop the total water falling on the whole area to roughly 70% of what it was before.

Evaporation does not occur from the soil surface below the forest, because it is the roots deep down that draw the water in and take it back up. The travel direction of water entering the forest is always downwards, and only upward as pure water transpired from the leaves. In a forest, water never travels upward again to the surface of the soil for evaporation. We therefore get no salting, no upward migration of salts to the soil of the forest.

Mineral Cycles

These mineral salts are instead taken up into the trees as essential nutrients; they are fixed in the forest. After you cut the forest down, what happens is that, even if the streams continue to run clear, they will contain enormous quantities of dissolved salts. We may be getting more tonnage running off cut-over forest land as dissolved salts than we get as actual silts. We have measured that in Tasmania. Just tons of essential material, particularly calcium, is being washed out of the forest when the trees are cut. The forests were holding all these minerals. They collected them, held them, and turned them round and round and round in usage. When you cut the forest, and there is nothing to hold these minerals, they run-off into the streams and flow to the sea. A lot of work is undone there, because some of that calcium was slow to accumulate in the forest.

Light

Finally, let us ask, what does the forest do to sunlight? The forest enters into energy transactions with light. We can't treat any tree, or any forest as a mass. It is a collection of individuals that do individual things to light. One obvious interaction resulting in energy swap-offs occurs with sumacs. Look at the sumac. A light wind blows on a sunny day. The sumac turns from an absorber into a reflector. Suddenly its whole light-energy balance changes. It uses one energy to change its effect on another energy., It is in constant energy balancing.

I believe that trees have two or three methods by which they govern their energy intakes. One would be used by the aspen. The aspen is basically doing something with wind energy, and when it's not doing it with the wind, it is doing something with the sun. Ivy, on the other hand, are certainly doing something with the orientation of leaf surface to sunlight all the time. They are governing to a constant. Other trees have shiny underleaves and mat-covered top leaves, and they do a wind-light trade-off.

There are forests in Tasmania in the depths of which we cannot measure light. You can go down two hundred feet into some of these valleys and there is no measurable light because the forest is intercepting all of it. You don't have those forests here (in New England), but we have them. You can descend into the blackest midnight in those forests. You have to take torches down there in brilliant daylight. Because the forest completely intercepts ultraviolet light and passes through more of the red light, you have a different quality of light within the forest. Dark trees become radiators. The birches are reflectors. In the reflector species, the tree itself doesn't get much heat. But in some species the tree becomes the heat store, and what a heat storage system! It is 86% water heat storage. And even on real bitter nights in Tasmania, where we have thick forest above, we get a warm down-draft through thousands of enormous water storages which have been absorbing heat all day.

The quality of air moving through forests changes. The amount of negative ions increases sharply in the air stream, and most of the gases which are obnoxious to us are absorbed very efficiently. Negative ions are also excellent precipitators, which might account for the fact that a lot of the dust

disappears in forests.

It is an error to suppose the forest stops at the soil surface. It doesn't. At least 40% of its mass is below the surface. When a forester talks about the weight of a forest on the earth, he probably is not giving us the weight of a tree plus its roots. They say '5,000 cubic feet of wood in this tree, therefore 4,600 cubic feet of water'. And I believe they forgot about the roots. Those roots down there are enormous storage organs. And they are busy at work doing other things in the soil. We know they are on the move. They throw up whole masses towards the surface and pull them back while they throw others down. And they do it all seasonally. What they are actually doing is living and dying in the soil, leaving all sorts of channels and pathways open, which is going to have a lot of effect on water. What's going on within those roots? Once we get below the top of the ground, we are in a whole new mystery zone. Certainly tree roots are breaking down primary rock material.

Now for all these reasons, and many that I haven't mentioned, because I consider them to be far too complex, forests are really worthwhile just to leave in place and really have a good look at, because mankind has never studied them. It wasn't until the 1950's that anybody I know of looked back through the rainfall records and cutting records, and started to do the sums.

This I am certain about: By the removal of ridge forests alone, we can produce deserts in any climate. By the removal of forests alone, we can remove soils, I am certain that the removal of forests has been the main cause of the collapse of nations. Because when the forests are gone they just haven't got the water, the soil, or the climatic quality to sustain human life thereafter. We had better start to prize the forests a bit and to discover, not how to live without them, but how to live with them.

Bill Mollison is the Executive Director of the Permaculture Institute at Tyalgum, N.S.W., Australia. A prolific teacher, biogeographer, and renowned storyteller, he is the author of Permaculture I (with David Holmgren), Permaculture II, and Permaculture: A Designers' Manual. This article is adapted from lectures given in 1981 at Wilton, New Hampshire. "Forests in Permaculture", is one of a series of pamphlets published by Yankee Permaculture based on the transcripts of Mollison's Permaculture Design Course. It and others in the series are available from Yankee Permaculture, PO Box 16683, Wichita, KS 67216 USA.

Managing Forests for Biomass Accumulation

Michael Pilarski

Friends of the Trees calculates that we need to double the number of trees on the planet to optimize earth climate for human habitation. This would adjust the carbon and oxygen cycles on the planet, which are now severely disrupted through worldwide deforestation and fossil fuel use and abuse. Almost everyone laments the destruction of the Amazon rainforest. Less well publicized is the fact that forest destruction rates in the Pacific Northwest and British Columbia are as severe as in Amazonia.

It is imperative that humans manage ecosystems to maximize carbon tie-up in biomass (organic material—dead and alive). We need a forestry that preserves biomass in the forest even during logging operations. Old-growth forests in the Pacific Northwest have been measured to have more tons of biomass per acre than any other ecosystem on the planet. Present clearcutting methods dramatically churns up the soil. The biggest trees are hauled away and the slash and site burnt. This effectively releases most of the carbon stored in the system into the atmosphere. We need minimum impact logging practices, uneven-aged (stands) management, selective cutting, and maintenance of productive forests for high content of down dead logs, snags, and humus. The examples of this type of forestry are rare in the Northwest, but there are some. It is possible to achieve productivity and sustainability at the same time. In fact, non-sustainable practices can never lead to long-term productivity.

Friends of the Trees Society believes that all remaining old-growth forests in the world should be allowed to evolve as they will. There is precious little left. The Pacific Northwest is fortunate to be one of the places with some old-growth left. Clearcutting as a forest practice should be banned.

Putting our forests on a sound, sustained-yield basis using ecologically benign logging methods would mean more jobs, instead of less jobs for loggers. Selective cutting, horse logging, and minimum impact logging take more workers than conventional clearcutting. Also there are only a handful of timberlands in the whole Northwest which are being managed anywhere near as intensively as could be profitable in the long run. We need many more foresters and woodsworkers to manage our lowland, easy-access forests. We need to build up our forest resources, not permit any more cut-and-run forestry. In other words, conservation and more jobs for loggers go hand in hand. Current management practices in the timber industry are not in the interests of long-term job security for forest industry workers.

Friends of the Trees is on record since 1986 as calling for a moratorium on cutting of all old-growth forests everywhere in the world. However, I am not just a "lock-it-up environmentalist", I believe in forest management on much of our lowland forest areas. For years I have been working in the field of permaculture, which can be simply defined as a synthesis of agriculture, forestry, and ecology. When I go to agriculture conferences I tell farm people that there needs to be a marriage of agriculture and forestry. Agriculture needs trees. How can we better integrate agricultural production with the production of timber and other forest products? Foresters have an obligation to farmers. Forests are the watersheds and wind buffers. Bad forestry has direct negative effects on adjacent or downriver agriculture areas. This relationship is all too often neglected in present forest management.

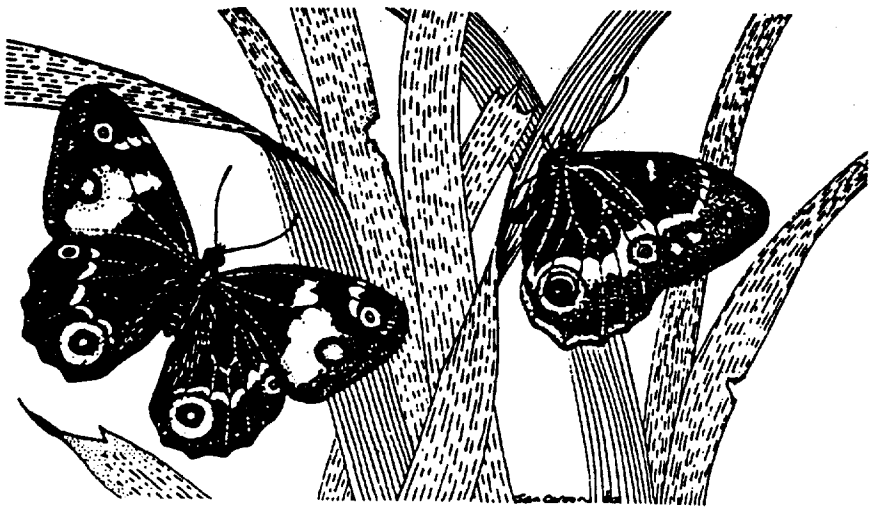
Friends of the Trees Society was founded in 1978 with the goal of doubling the world's forest cover. This might seem somewhat rhetorical to the scientist who sits down with the forest statistics of the world. Unfortunately, forest statistics are largely drawn up by government bureacracies which either distort the figures to make it easier to increase "sustainable" yields, or simply don't know what is out in the field. Most national forest statistics are inflated. Taken all together the world has suffered and is continuing to suffer staggering forest losses.

Part of the prescription for doubling world forest cover is increased forest density. Especially in the dry regions of the world forest density is below optimum due to grazing, woodcutting, and other human-induced changes. Acid rain and pollution also thin stands in many north temperate regions. Even in the moist Pacific Northwest some stands are understocked.

In the maritime Pacific Northwest, the goal is not so much to increase forest cover as it is to increase the quality of the cover, i.e., more biomass, higher canopies, larger and more valuable timber trees. However, in the eastern Cascades and the intermountain Northwest there is a lot of room for increasing the extent of forested area as well as increasing stand densities and quality.

Public opinion on forest preservation is steadily swinging in favor of the trees. How soon will the people of the Pacific Northwest put a ban on cutting any more old-growth? How much will be left at that point? The logging industry and the U.S. Forest Service see the handwriting on the wall and are cutting as much old-growth as they can. When their reign is over, we can begin to manage the forests for biomass accumulation and restore them to much of their former glory.

This article is reprinted with permission from Friends of the Trees Society Newsletter, a pithy, international publication offering tasty news notes of the Northwest, selected publications for sale, Actinidia *Enthusiasts Network information, and excellent bibliographies. It reports development of the Traveler's Earth Repair Network (TERN). Contact: Friends of the Trees, PO Box 1064, Tonasket, WA 98855.*



IPC4 continued from pg. 11

the King. Until elections occur for the new party-based government, an interim government has been installed to run the essential services, to coordinate formation of the new constitution and policy, and to conduct (within one year) nationwide elections.

INSAN sees this as a tremendous opportunity to include Green/Ecology/ Permaculture concepts and principles into government policy at its inception. Such an approach would allow short-term needs for food, fuel, industrial products, etc. to be placed under a long-term strategy based on sustainability and growth. It would also allow for the education system to include such concepts as a standard part of its syllabi (from primary school to doctorate) and overall allows long term protection of health for people and their environment.

This is a highly 'topical' and relevant subject, and one for which suggestions or recommendations for action could realistically be taken up by the new government of Nepal. Thus INSAN puts out a special request to PC groups and individuals and those involved with green politics for information pertaining to the structuring and integration of such concepts into government policy. A wholistic approach is needed, one to cover all aspects of government: health, education agriculture, finance, industry, etc. Moreover, approaches are needed that can meet the specific demands of Nepal and its people in such a way that they provide a model of a sustainable and permanent culture to other third-world nations, and ultimately to the "developed" nations also.

Fourth International Permaculture Conference (IPC IV) papers, workshops, etc. will be given special attention if this type of information is available to be disseminated, and a committee especially devoted to national policy planning will be set up with the objective of creating a Sustainable Total Design for Nepal. IPC4 will provide time and space for discussion and action-based formulation by designers and teachers from around the world.

Badri Dahal is Director of the Institute for Sustainable Agriculture, Nepal. For further information on IPC4, see page 27.

Permaculture: Strategies for Development in Nepal

James Jiler

Read any periodical devoted to development and ecology and one word consistently appears—"sustainable". For the first time, international as well as regional groups and councils have publicly endorsed the need to set our planet's future on a path to sustainable living. Common sense prevails.

Yet how long can we wait before all the talk actually transpires into a suitable plan of action? The issues confronting us are complex. But here at INSAN we have developed a simple solution that could actually amend many of the problems facing agro-dependent developing nations like Nepal. It's a challenge we put to individuals and agencies here who are concerned with development. Your feedback is not only welcome. It's necessary!

Nepal is divided into 5 development regions which are made up of 14 zones that together comprise 75 districts.

We propose creating a model farm in each district as a center for agro-ecology research and development. Each farm would be completely self-sufficient in fuel, fodder, and food and would conduct extension and training throughout the region. Live fencing, plant stacking, intercropped plantations, companion planting, and composting would integrate with livestock production on land no bigger than the average Nepali farm.

The estimated cost for creating a model farm of this kind, excluding purchase of land, would amount to US$10,000 during the five years it would take to establish. This sum would pay for initial training materials and agricultural inputs.

Each farm would also identify with area schools. Children would integrate school studies with principles in agro-ecology, conservation, health care, family planning, and science.

As farms became more self-reliant, animals, once used to roaming through marginal landsites would gradually be confined to stalls or designated pastures away from recovering forest

lands. This could create village timber estates providing additional income for villagers. Funds could be channeled into water supply or cooperative marketing schemes, health posts, threshers, and educational resources.

The success of each farm would have a direct bearing on the propagation of additional sites throughout each region. And the price tag for country-wide establishment? A mere $750,000 spread out over five years. If it seems a lot, consider this: one paved mile of a newly constructed road in rural Nepal costs roughly one million dollars.

Now consider this: such a program is already underway. Eight farms have been selected and are under establishment in four of Nepal's five development regions (only the Far West is remaining). Some of these are private, some are contracted by other NGO's (non-governmental organizations) and others are run directly by INSAN. As such, the basis for Zonal establishment is in place and from this can develop the district by district approach.

Time however, is critical. In the coming years the need for the implementation of sustainable systems will increase dramatically. INSAN has a start. It also has a core of 75 trained graduates capable of establishing projects of their own. With increased public support the number of farms now underway could multiply ten-fold. The result could have far-reaching effects for all of Nepal.

James Jiler is the editor of the "INSAN Newsletter". *This piece originally appeared in their Fall/Winter issue, vol.3, no.1.*

North American Organizing Update

Cynthia Edwards

IPC4 continues to evolve as planning moves forward. Computer links have been established between Australia, N. America, U.K., Denmark, and soon Nepal. INSAN now has a modem, thanks to Lea Harrison and Tom Lhares in Australia. This direct communication at low cost will greatly improve organizing efforts.

Site construction is underway at the INSAN demonstration farm in Biratnigar with assistance from Australian architect Brian Woodward. This will also be the Convergence site and an opportunity for site design input by participants.

We urge all North American permaculturists to get involved with the planning and support work even if we cannot all attend. IPC4 will have an important effect on PC and the world.

IPC4 : Conference, Convergence, Courses

The Institute for Sustainable Agriculture Nepal

GPO Box 3033, Kathmandu, Nepal. Ph: (977) (01) 220448; Fax: (977) (01) 524509; Cable: INSAN; Telex: 2439 ICIMOD NP.

Permaculture Conference

The aim of the conference is to provide a forum for discussion on and action by permaculture in cooperation with the policy makers, planners, aid workers, press and members of the public who will be attending.

People from all over the world who are involved in sustainable agriculture systems and research, development organizations and policy and other related fields will be invited as guest speakers. They will be speaking on a variety of topics including:

- Sustainable farm systems;
- Energy efficient housing;
- Ecologically sound village and urban design;
- Cooperative economic systems that foster community self-reliance;
- New directions for aid projects.

Time: Opening ceremony - 10 AM February 10, 1991
Closing function, Feb. 15.

Cost: (includes lunch, morning and afternoon tea) - rates in US $;

Paid before 1/8/90	$240
paid between 1/8/90 and 1/2/91	$270
paid after 1/2/91	$300

To Register: The best method to send money is by telegraphic transfer to INSAN's current account No. 30056 Nepal Bank Ltd., Kathmandu. Please mail a copy of the bank slip to INSAN's office with your registration form. Accomodation is available at a variety of local hotels at rates from $5/nite to $35 or more/nite.

Permaculture Designer's Convergence

Immediately preceding the International Permaculture Conference the convergence is an informal gathering where permaculture design course graduates can exchange and update information and decide organizational policy. People who are not design course graduates are welcome as observers only.

Time: Starting 9 AM on Feb. 2, 1991, Closing, Weds. evening Feb. 6

Place: The Permaculture Demonstration Farm near Biratnagar, Nepal in the sub-tropical eastern Terai, 450 km east of Kathmandu. The farm has recently been purchased by INSAN and any profits from the conference will aid in the development of the farm. There will be an opportunity to join in on-site tree planting and to have design input. We hope the convergence will foster understanding and appreciation of Nepali village life.

Accommodation : will be on-site in simple but comfortable building made from traditional local materials. The food will be grown mainly on site. As there is no electricity in this area, power for audio visual equipment will be supplied by generators.

Cost: (including food and accommodation)

Paid before 1/8/90	$240
paid between 1/8/90 and 1/2/91	$270
paid after 1/2/91	$300

Transport: from Kathmandu to the convergence site near Biratnagar

Chitwan Bus Tour	$145 approx.
Direct Bus Travel	$10 each way
Plane	$85 each way

Chitwan Bus Tour (29th January - 1st February) is an opportunity for convergence participants to visit three local farms in Chitwan district, as well as a visist to Royal Chitwan National Park, famed for wildlife such as the Bengal Tiger and the one-horned rhinoceros. This tour is limited to the first 40 people who register for it.

• Permaculture Design Courses - Nepal

Pre-Conference Design Course: January 13 - 25, Kathmandu
Post-Conference Design Course: February 21 - March 7, Kathmandu

IPC4 Registration Form

I will be attending the conference only [ ]
I will attend both conference and convergence [ ]

Dietary preference Vegetarian [ ]
Non-vegetarian [ ]

Do you wish to have hotel bookings arranged by INSAN? Y/N
If yes, please indicate date(s).

From To
From To
From To

also indicate hotel preferences (rates are per night):

Basic Guesthouse (room & common bath) $ 5-10 [ ]
Basic Hotel Room (room & attached bath) $10-15 [ ]
Medium-Priced Hotel $15-25 [ ]
Luxury Hotel $35+ [ ]

For Designers' Convergence Participants Only:

Travel to convergence site via Chitwan Bus Tour [ ]
Direct bus travel to convergence site [ ]
Direct Flight to convergence site [ ]

Amount of money enclosed (US$):

Conference Registration $

Designers' Convergence $

Travel to Biratnagar:
Chitwan Bus Tour $
Direct Bus Travel $
Direct Flight $

Permaculture Design Course 13-25 Jan. $

Permaculture Design Course 21Feb-7Mar $

TOTAL AMOUNT ENCLOSED $

A Note from IPC4 Organizers: There will be a limited amount of money available for direct mail promotion of IPC4. Please photocopy or reprint these pages and distribute the information to as many people as possible. Thank you for your help!

Karmic Converter

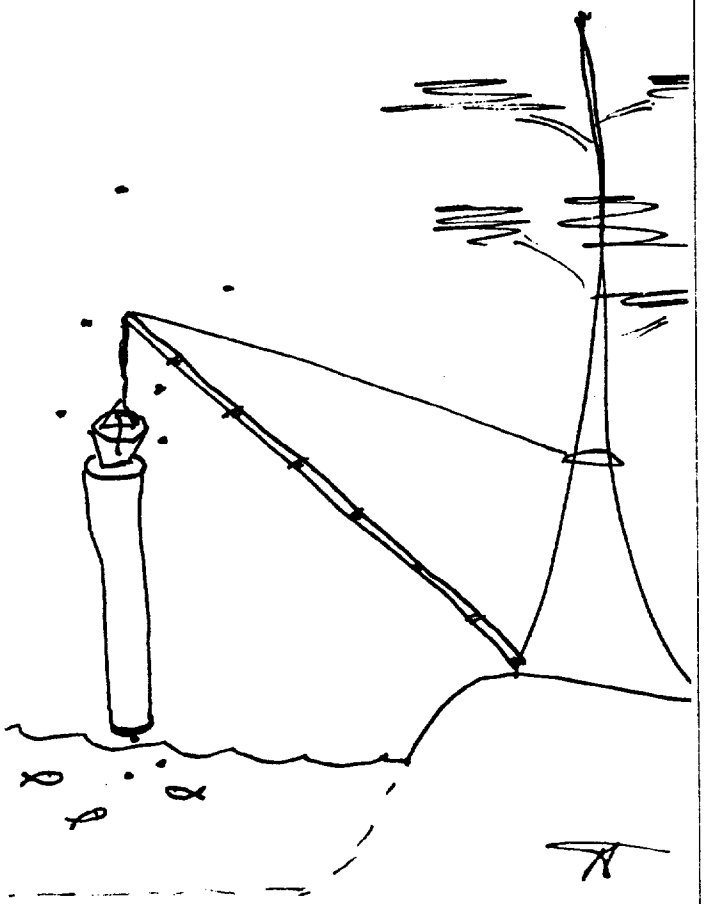
(Or How to Change Pesky Japanese Beetles into Very Tasty Fish)

Adam Turtle

Commercial Japanese-beetle traps normally use a reservoir (either jar or bag) and require emptying or disposal. What we've done is to attach a four-foot section of PVC pipe in place of the usual jar and suspend it over our lake with the bottom of the pipe about three inches above the water. The fish quickly learned to hang out under the 'feeder' and wait for lunch.

We found that when there are enough live beetles, the fish (bluegills, bass, and channel catfish) won't touch dead ones. But later when live ones are scarce they'll take what's available. Now the surplus beetles from our conventionally rigged traps in the gardens, orchards, and nursery are dried and saved in garbage cans to feed out in the fall.

So don't cuss the beetles, just be grateful for free fish food! (Chickens and ducks like 'em too.)



Reports from Regional Groups

A Bulletin Board of PC news and events from across North America. Send reports of your group or project to Editor, The Permaculture Activist, P.O. Box 3630, Kailua-Kona, HI 96745. Deadline for the next issue is September 21, 1990.

Earth Advocates

Greetings from Nobody's Mtn. here in Tennessee. Decided it was time to let the rest of you know we're here and what we're up to. We are Sue & Adam Turtle and we steward 360 acres of land on the escarpment of the Cumberland Plateau in northeast middle Tennessee. Most of the mountain is forested and we are presently working with about 4-5 acres. We've a small nursery, a half-acre lake, a vegetable garden, and in open fields and woods and edges scattered plantings of such things as bamboo (87 species), blueberries (76 species), *Actinidia* (36 species), grapes, *Ribes* , *Rubus* , a dozen or so of the hardy *Opuntia* 's, figs, grasses, *Prunus* , fruiting roses, fruit and nut trees, herbs and medicinals, wildflowers, native plants, bulbs, etc., along with several springs, good creeks, and a couple of small ponds.

Adam has been here about sixteen years researching lesser known (and some well-known) perennial food and medicinal plants with permaculture focus added nine years ago after his first PC course with Bill Mollison and Andrew Jeaves in 1981. Adam's been particularly interested in drought and neglect-tolerant species for the interior southeastern highlands, and he works with plants from all over the world which might do here. There are many successes and many failures and we learn from both, often more from the failures. Sue joined Adam last year, coming from Massachusetts with a background of organic vegetable gardening and organizing for the Eastern PC group. Most of you who do, know her as Sue Colpas-Ross. We formalized our working and personal commitments last fall on the Equinox.

We'll mention just a few of the things we are working with here. We've quite a problem (or is it a challenge and opportunity?) with animal predation—from deer, rabbits, skunks, woodchucks, and everything in-between. Yes, if you live in the woods and make a clearing and plant food, they'll all show up. We've fenced in the vegetable garden and the nursery area. Otherwise—we use alternative methods to keep our plantings intact. For young fruit and nut trees we plant Rubus around the trees and weave a basket of the canes. The deer steer clear of the thorns. Hiding plants "in the weeds" also protects them. Adam decided immaculate gardens would not work here, so now a variety of species get mixed together in each planting. We've also found that adding into the mixtures plants which deer and other critters don't eat tends to keep them away—plants such as garlic, *Digitalis* , *Artemisia* —esp. *absinthum* ; the tansies work well.

The lake was dug three years ago and is beginning to look pretty! The dam was solid clay dug from the place where the lake went. The dam's slowly being covered with grasses and wildflowers, and last year we stocked the lake with bluegills, catfish, minnows, bass, and two grass carp. Slowly we're creating habitat around the lake. Adam thought up an easy and inexpensive way to feed the fish. (See the article on japanese beetles to fish—karmic converter.)

Earth Advocates is our consulting d.b.a. We offer on-site consultation, tailored workshops, research and consultation through the mail, a plant finding service, and workshops here at the Mtn. at various times of the year. Our small nursery is a local sales only nursery where we sell mostly those plants we find in our research to be easy to propagate and easy to care for. If you write us and want an answer—please include a SASE.

We're involved with a number of organizations, both local and national, where we share and learn. We suggest strongly that more permaculture people become involved with some of these organizations—it's a way to gain knowledge and to share permaculture. A few of these are the Tennessee Alternative Grower's Association (TAGA), Carolina Farm Stewardship Association (CFSA), Northern Nut Growers Association (NNGA), North American Fruit Explorers (NAFEX), Southern Fruit Fellowship (a local group of NAFEX members), American Rock Garden Society, Native Plant Society (our is in Tennessee—there are others in most other states), The Land Institute, American Gourd Society, American Bamboo Society (with six local chapters in different parts of the country). Perhaps a good project for someone would be to list all national and regional organizations to be published in the Activist. (I know some of this was accomplished in some of the old TIPSY's—but they need updating).

Anyone's more than welcome to contact us—remember to include a SASE with all inquires if you want a reply.

Adam and Sue Turtle
Earth Advocates
Rte 3, Box 624
Livingston, TN 38570-9547

Northern Mexico Permaculture Institute

To contact the Northern Mexico Permaculture Institute, write to:
José Valdéz Romero
Rio Conchos,
150 Col. Fuentes del Centenario
Hermosillo, Sonora, México

Translation of Permaculture: A Designers' Manual into Spanish is close to completion, with plans underway to publish a Spanish edition of Permaculture Drylands.

Great Northwest Permaculture

'Promoting the Art and Science of Environmental Design'

Great Northwest Permaculture is a research and education institute, organized to assist in global efforts of earth repair and to create environmentally responsible community developments in the Northwest.

Environmental Design Education

We continue introducing permaculture to land managers and educators in and around the Columbia River Bioregion. Introductory workshops, a continuing permaculture series, and Permaculture Design Courses with Larry Santoyo, Simon Henderson, Rick Valley, Jude Hobbs, and others are currently being scheduled. Contact GNP to schedule a workshop or course in your area.

Research and Consulting

Environmental Design Consultants are available for community development, landscape design, habitat restoration, and natural farming projects. Fee schedule for research and consulting is available upon request.

Commonworks: A Business Coop

Great Northwest Permaculture is currently organizing a collective Greenhouse/Cafe/Gift shop/Landscape design and cottage industry center. Opportunities available for investor participants.

Introduction to Permaculture Video

Production of a video series for public television begins this fall. To include your project or ideas in the presentation, please contact us as soon as possible.

Food Forest Project

Through generous donations, this spring, we were again able to give out thousands of "food forest" tree, shrub, and vine seedlings along with permaculture design information to hundreds of land managers, home owners, and PC designers.

Quarterly Newsletter

Our newsletter "The Worksheet" is published as part of the bioregional journal, "Columbiana Magazine".

Support Needed

Financial support and volunteers are needed to assist our efforts. Membership fees help support our work and include subscription to "Columbiana Magazine". Membership fees start at $25 per year. Further donations are needed and very much appreciated.

For more information send SASE to:
Larry Santoyo, Director
Great Northwest Permaculture
2073 Marble Valley-Basin Rd.
Addy, WA 99101
509-935-4578

"The Permaculture Edge"

For 13 years now PC Nambour (Inc) has produced first a newsletter and more recently a magazine "Living and Growing". Thanks to the various editors, contributors, and helpers, PC Nambour has been able to communicate many innovative ideas.

Community awareness of environmental issues is growing and with it an increasing number of people are taking personal responsibility for a sustainable way of life and are looking for models to follow.

Permaculture is at the edge of this change. PC Nambour feels that the time is right to take our next step. We have now published the first issue of a new magazine, "The Permaculture Edge" which is being distributed worldwide. Its contents deal with all issues which a sustainable world has to be concerned with—from agriculture to town planning, from social to political issues. It reports on both successes and failures from around the world for the reader to learn from. It provides a forum for ideas which are "at the edge".

The magazine is aimed at Permaculturists everywhere and those looking to Permaculture as a model to effect changes towards a sustainable way of life. We invite you to participate in this exciting venture in several ways:

* as a contributor - Share some aspect of your experience and knowledge as a permaculturist.
* as a subscriber and reader - Feedback in the form of suggestions and letters to the editor will be welcomed.
* as an advertiser - If you have a product or service you wish to advertise, consider that "Permaculture Edge" will reach readers who are interested in a wide range of PC activities.

Advertising rates on application. The magazine will be published four times a year and will be printed on 100% recycled, unbleached paper.

Subscriptions: A$16.00 per year (Overseas subscribers - A$20.00 per year bank draft A$ please.)

Writing Articles for "The Edge"

Remember that the magazine is principally aimed at people who have a basic understanding of permaculture. Our readers have very likely graduated from reading "earth", "alternative farming" and "self-sufficiency" magazines. They want "how-to" information and will learn from the experiences of others anywhere in the world. Your article may address any subjects which are covered under the heading of permaculture. These include:

*Philosophy and Ethics
*Aquaculture,Water, Soils, Plants
*Design, Patterns
*Animal Husbandry
*Architecture
*Townplanning and Settlement
*Ethical Investment
*Environmental Economics
*Earthworks
*Experiences, ideas.....

Articles should best be typewritten or neatly handwritten or submitted on IBM format (5-1/4" or 3-1/2") or ATARI ST format discs as ASCII files. Length does not matter as long as it is appropriate to what you have to say. We prefer black and white photos, line drawings, or original cartoons, and will return them to you if required. Report accurately; give a reference to the locality the article is written for. This increases relevance for readers who have to deal with other climatic conditions.

If your material is published, we will give you free issues of the magazine.

Permaculture Nambour (Inc.)
PO Box 650
Nambour 4560
Queensland, AUSTRALIA

North American Permaculture

Larry Santoyo

We are organizing support services for regional permaculture groups and individuals. Ideas, suggestions, and requests can be sent to the address below. Some of the projects that we are currently working on are the following:

Permaculture Designers' Manual Reprint

In cooperation with Permaculture Drylands (Santa Fe, NM) Mollison's book has been reprinted in the U.S. The book has been re-edited, cloth-bound, and re-titled, *Permaculture: A Practical Guide for a Sustainable Future*. It will be available from Permaculture Drylands at the retail price of $34.95. Wholesale inquiries should be sent to Susan Buchanan c/o 1536 Richmond Dr., N.E., Albuquerque, NM 87106.

Permaculture Brochure

A brochure answering the question, "What is Permaculture?" has been prepared in cooperation with Sonoran Permaculture Association (Tucson, AZ) and is available as 'black and white' copy. A space is provided on the brochure to paste local contact information. Regional groups and individuals may request the copy and print the brochure themselves listing their local resources. Please enclose a donation with your request.

Education 'Switchboard'

The Permaculture Activist Calendar (see back cover), published quarterly in February, May, August, and November, provides a scan of the course and workshop activity among regional PC groups across the continent. Listings are free to course organizers. We attempt to include a range of events which may be of interest to permaculturists everywhere. Between issues information is available from "The Permaculture Activist," PO Box 3630, Kailua-Kona, HI 96745, (808)322-3294. Please send self-addressed, stamped envelope (SASE) with inquiry.

People and Projects Worknet

Natural farming, land restoration, and community development projects need the contributions of many skilled and able persons. "The Permaculture Activist" Classified section serves this function for North America. Project managers who need help and people interested in PC work experience are invited to send information about their projects, skills, requirements, and compensation. (For our modest rates, see pg 39.) Overseas connections can also be made through Travellers Earth Repair Network (TERN) c/o Friends of the Trees (Tonasket, WA). Please enclose a donation with your entry or request.

National Food Forest Project

Thousands of 'food forest' trees have been distributed at low or no cost. Organized by Great Northwest Permaculture (Addy, WA), surplus trees from nurseries and seed companies have been solicited, then distributed with permaculture information to homeowners, land managers, and permaculture designers. Help is needed to expand this project nationwide.

Designer's Guild Referral Catalog

Please advertise your products, services, and skills in our 'Permaculture Yellow Pages'. A catalog of products, services, and skills is being compiled in cooperation with Great Northwest Permaculture (Addy, WA). This catalog will be sent out to answer requests for referrals of Permaculture Design Consultants. The production and distribution of the catalog will be funded by advertisers and will be distributed free or at nominal cost to potential clients upon request.

Design Course Graduates Directory

Not all Permaculture Design Course graduates are practicing consultants so this 'Permaculture White Pages' is being compiled as a separate list. Graduates listed in the '87 Directory are asked to forward their updated addresses and one line of information each. Teachers and organizers with lists of more recent graduates are also asked to forward information. Please help—these lists have proved to be very useful in the past and are badly in need of updating.

Ideas, Suggestions, and Proposals Needed

Re-organization is under way and more ideas are needed, your input is welcome. Management structure, organization goals, and ways and means to best serve the Permaculture Community all need your input. 'Heartland Permaculture' (Austin, TX) and 'Gap Mountain Permaculture' (Jaffrey, NH) are hard at work, brainstorming ideas. Please send us your suggestions.

For more information, contact the groups mentioned above or send SASE to:

North American Permaculture
PO Box 573
Colville, Washington 99114
509 684-5969

Publications Coordinator Needed at Aprovecho

The Aprovecho Institute announces an immediate job opening for a publications coordinator. Applicant should possess the following qualifications:

*Good sense of graphic design and editing skills.

*Reasonable typing skill.

*Understanding of deconsumerism and interest in how to publish this information through knowledge of consumptive societies and sustainable alternatives.

*Ability to promote the evolution of "News From Aprovecho" to reach a wider audience.

*Ability to syndicate articles into other newsletters and publications.

*Ability to manage a small production team of volunteers and interns.

Write or call Kristin at Aprovecho Institute, 80574 Hazelton Road, Cottage Grove, OR 97424, phone 503-942-9434, mornings.

In Memoriam: Dr. Robert A. Macoskey

On May 11, 1990 over two hundred people gathered to celebrate the life and mourn the death of Dr. Robert A. Macoskey, who passed away on May 7th at age 60. Dr. Macoskey was a man of vision and a man of action. Long ago he recognized the need for us all to become earth stewards. He dedicated much of his life to the healing of the earth. His enthusiasm touched countless lives and inspired many to become involved in that healing process; to work, each in one's own small way to make a difference.

Head of the Philosophy Department at Slippery Rock University and Director of the A.L.T.E.R. project, Dr. Macoskey worked unceasingly to bring concepts of sustainable design to the academic world. His most recent work includes development of a Master's Program in Sustainable Design at S.R.U., creation of the Harmony House model homestead, support for O.C.I.A.'s organic certification programs, development of university level permaculture design courses, and participation in the permaculture network as secretary of the North American Permaculture organization.

It is a bitter irony and a great tragedy to lose Bob Macoskey just as his efforts and vision are bearing fruit, in a time when the larger public is awakening to hear the message he had to bring. His untimely death leaves a great void in the lives of those who knew and loved him. He will be deeply missed.

Darrell Frey

Permaculture Educational Programs

A treasure of diversity, and the most comlete guide to permaculture courses, workshops, seminars, and symposia in North America. These programs are funded, organized, and taught by independent regional groups and individuals involved in permaculture work. Publication here does not imply certification or endorsement by "The Permaculture Activist". We encourage all groups to contact us with news of upcoming events.

Trees: A Permaculture Perspective

Dates: August 11-16, 1990
Location: Whispering Pines Farm, Lake Chelan, WA

This seminar will focus on solutions to the worldwide forest crisis. We will devote much of our attention to practical tree skills such as tree planting, seed collecting, nursery practice, grafting, orcharding, etc., including a 2-day field trip through the Chelan and Okanagan Valleys with stops at organic orchards and nurseries.

Instructors: Michael Pilarski, Ron Engeland, Bill Schildgen, John Brownfield, Jimmy Cook, and Michael Hample.

Facilities: Whispering Pines Farm is set in a mountainous landscape of ponderosa pine, Douglas fir, and bitterbrush, overlooking Lake Chelan in the North Cascades. The site is near Glacier Peak Wilderness and the North Cascades Nat'l Park. Hiking opportunities abound. The site has no building accommodations. We will be camping on the floor of 25 mile-long Creek Canyon.

Cost: $250-$300, sliding scale, includes campsite, 3 meals/day, instruction, curriculum materials, and field trip. Non-refundable deposit of $50 required to register. Weekend or single-day attendance possible at $50/day.

Contact: Friends of Trees
PO Box 1064
Tonasket, WA 98855

Restoration Forestry Conference

Dates: November 9-11, 1990
Location: Lost Valley Center, Dexter, Oregon

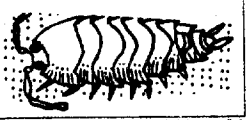
The Restoration Forestry Conference will bring together people interested in alternatives to the present clearcut-and-run logging methods prevailing in the Pacific Northwest. Michael Pilarski of Friends of the Trees Society will speak on old-growth forestry and biomass forestry.

Contact: Lost Valley Center
PO Box 111
Dexter, OR 97431
503-937-3351

Introduction to Permaculture Thinking
Applications for Small-Property Owners

Dates: September 1-3, 1990
Location: Nobody's Mountain, Livingston, TN
Contact: Sue & Adam Turtle
Earth Advocates
Rte 3, Box 624
Livingston, TN 38570

S.A.S.E. with all inquiries, please.



Permaculture Educational Programs

Applied Permaculture: Taking the Next Steps

Permaculture Design Teams Take Eastern North America by Storm

Spawned amidst floods, tornados, and the Advanced Design Course in Alabama this past March, the PC Design Team Road Show will begin its first tour in late August 1990. PC grads are invited to participate in this exciting exercise of design team fieldwork.

Purposes: 1) To continue to improve skills in design, communication, process, and teaching; 2) To support the implementation of PC designs in North America for use as demonstration and teaching sites; 3) To help create local networks for the host sites through public talks and workshops related to the design site process; 4) To have fun, play together, and strengthen the network.

The Scenario: The host sites will each provide meals and housing for participating graduates (though some donations may be needed), will organize technical workshops in areas such as drafting, dowsing, hydrology, etc., and will sponsor a public presentation introducing permaculture and the local design process.

Requirements: The participants will provide their own transportation, bring resource materials and tools, lead a talk or workshop in an area of expertise or interest, be prepared to work hard, and produce as complete a design as possible.

Dates: late Aug-early Sept., 1990
Location: St. Catherine's, Ontario, Canada (40 ac.)
Contact: Michael Ruehle
442 Spadina Ave.
Toronto, Ontario
Canada M5T 2G6
416-920-3833

Dates: Sept. 28-October 6, 1990
Location: Heathcote, MD (35 acres)
Contact: Cynthia Edwards
21300 Heathcote Rd.
Freeland, MD 21053
301-343-0280

Fifth Annual Eastern N. American PC Conference

Focusing on improving technical skills in both applied design and teaching, the conference will culminate a week-long design team process on the 35 ac. Heathcote site near Freeland, Maryland. The team design will be presented for input and improvements with a field workshop on the design process.

Proposed workshops include:
- Topographic Mapping
- Wetland Design
- Tree Crops in Design
- Teaching Techniques—a report from the Gap Mtn. course
- Field Design Practice

Guest Speaker: Jim Duke, presenting "Edible and Medicinal Perennials"

Programs: The conference will include a poster session to help present specific aspects of a participant's work or an idea which he or she may wish to develop. We will also sponsor an auction of goods and services (for which we need donations—please donate even if you can't attend!) and a trade fair, swapping plants, books, and literature.

Fees: $50-75, sliding scale, with various options for food and housing. Some work exchange will be available.

Contact: Cynthia Edwards, address and phone as above.

Garden and Greenhouse Workshop

Dates: Sept. 29-30, 1990
Location: Basalt Mountain, Colorado

Description: This two-day course will address permaculture as it can be applied to market gardening using the existing market garden as a demonstration. The course will cover

- composting and fertilizer teas
- soil preparation and amendments
- mulching and cover cropping
- plant propagation, cloches
- small animal foraging systems
- natural weed & insect control methods
- succession planting
- low maintenance perennials
- gourmet crops, sprouts
- edible flowers and ornamentals
- fruit trees
- and the transition from greenhouse to outdoor terraced beds.

Jerome Osentowski promotes the concept of a twelve-month growing season in Colorado's Roaring Fork Valley. Come and learn permaculture principles as they apply to the four seasons in a 2-day intensive workshop.

Instructors: Jerome Osentowski
Cost: $50 per day
Contact: Central Rocky Mtn. PC
PO Box 631
Basalt, CO 81621
303-927-4158

Toward a Standard Permaculture Course Description

The Activist encourages the advertising of PC courses. To alleviate guesswork and reduce wordage, we suggest the following outline:

Headline: (name of course)
Dates/Location:
Description: (short, concise, pithy)
Instructors: (names and brief remarks)
Cost: Note significant exclusions
Facilities: This includes remarks about the climate and scenic opportunities.
Contact: (name, address, and phone #)

One to three hundred words are sufficient to describe virtually any event. In this context, the specific is more valuable than the general. Enclose any brochures or backup information to help the editors get the full picture. Graphics are useful.

Please keep in mind that there are many references to the basic design curriculum throughout this paper. It isn't necessary to repeat them in each course outline. Do emphasize what your special focus may be, and the qualities of the instructors or of the host site which are unique or attractive.

Aprovecho Fall Workshops

September
•Root Cellaring for Food Storage
•Felting Techniques
•Retained-Heat Bread Oven Building
•And Baking Techniques
October
•Bamboo Maintenance & Propagation

Please call to confirm dates.

1991 Courses

GUATEMALA STUDY TOUR OF ECOLOGICALLY SUSTAINABLE SYSTEMS, February 2-17, 1991. Register by December 1, 1990.

HOMESTEADING SKILLS, hands-on learning tool upkeep, permaculture techniques, water systems, organic gardening, compost, hand cart construction, stove designs, solar technologies, and other appropriate technology, May 11-18, 1991.

INTERNATIONAL SUSTAINABLE DEVELOPMENT USING PERMACULTURE TECHNIQUES - Permaculture design certificates offered, June 15-29, 1991.

Contact: Courses, Aprovecho Institute
80574 Hazelton Road
Cottage Grove, OR 97424
503-942-9434, mornings,PDT

Master of Science Degree in Sustainable Systems

Excellent progress has been made in our plans for this new degree program at Slippery Rock University. If everything goes according to our expectation it will be in place by Fall of 1990.

Prospective students will be able to enroll in one of three tracks:

1) Sustainable Agriculture
2) Sustainable Resource Mgmt.
3) Sustainable Structures and Energy Production

While a bachelor's degree in one of the natural sciences would be desirable as a background for this Master's degree program, it isn't a prerequiste. Our intention is to provide a useful and practical experience for the Generalist who shares our deep commitment to healing the earth. If you would like to keep in touch with our progress, call or write: Dr. William Shiner, Chair; PREE-SRU-Slippery Rock, PA 16057, (412)794-7503.

Drylands Permaculture Design Course

Dates: October 7-20, 1990
Location: Sunglow Ranch, AZ

Content: This two-week course emphasizes experiential design work, while covering the updated drylands design course curriculum. It offers an immersion in the practical and creative aspects of the design process, with daily hands-on experience.

Instructors: The teaching team consists of three experienced drylands teachers and consultants. Tim Murphy and Joel Glanzberg: An experienced drylands teaching team, Tim and Joel are also two of the most active PC consultants in the Southwest. Larry Santoyo: Founder of the Great Northwest Permaculture Institute, Larry brings to the teaching team his PC design experience in the drylands of California and the northwestern U.S., as well as many years of organizational experience.

Location: The course will be held at Sunglow Ranch in the Chiricahua Mts. of southeastern Arizona. Forming the edge between the Sonoran and Chihuahuan deserts and located at the juncture of the Rocky Mountain and Sierra Madrean biological zones, the Chiricahua's, one of the 'island' mountain ranges of the American Southwest, contain incredible biologic diversity. A nearby 40-acre PC design in progress will provide numerous opportunities for hands-on experience.

Fee: $700, includes all materials, dormitory housing, and all meals. A non-refundable deposit of $150 is required. Single-day attendance may be arranged at $50/day. The course will be limited to 28 participants.

Contact: Permaculture Drylands
PO Box 27371
Tucson, AZ 85726-7371
602-623-0054

PC Design Workshop at Grailville, Ohio

Dates: July 13-22, 1990
Location: Grailville, Loveland, OH
Content: •Permaculture Design concepts and technologies•Bioregional organization •Alternative Energy sources •Biodynamic Gardening and Farming •Composting •Soil nutrient cycles •Woods, Trees, Woodlots, Orchards •Ponds and Aquaculture•Keylining techniques and tools •Food Co-ops and Marketing for farm and garden.
Instructors: Paul Gallimore, Al Fritsch, Mary Baird, Patrick Bohlen, Rita Engelken, Dick Hogan, Mary Lu Lageman, Trina Paulus

Field Trips and Hands-on workshops: •Sun Stove •Sprouting and Juicing •Macrobiotic Cooking •Music & Folk Dancing •Art exhibits, nature studies, video tape and resource library.
Cost: $450-600 sliding scale includes full workshop fees, board and room, $50 deposit.

Contact: PC Workshop-Grailville
932 O'Bannonville Rd.
Loveland OH 45140
513-683-2340

(Ed. note: This came in too late to benefit the workshop; we ran it as a snapshot of regional news.)

What a piece of bread looks like depends on
whether you are hungry or not.
Jellaludin Rumi

PERMACULTURE EDUCATIONAL PROGRAMS

Central Rocky Mountain Permaculture Design Course

Date: October 19-30, 1990
Location: On the site of Jerome's market gardening operation at Basalt Mountain, Colorado—8 acres of remote mountain terrain.

Description: Emphasis on permaculture as applied to market gardening, desert homesteading using water harvesting strategies, and using trees for environmental restoration.

Instructors: Jerome Osentowski
Michael Pilarski
Dan Howell

Topics: Indigenous Materials
Local Self-Reliance
Observing Ecotones
Worker-Owned Enterprise
Energy Technologies for Urban, Suburban, and Rural Areas
Pest Control, I.P.M.
Integrated Building and Retrofitting
Marketing Strategies
Greenhouse structures, heating, cooling, production
Cloches
Small Animal Forages
Wild Foods

The course will also address permaculture as it can be applied to market gardening, using the existing market garden as a demonstration.

Cost: $500 to $550 sliding scale - includes all organic meals, camping, curriculum materials, and field trips. $100 deposit required for registration. Limited to 25 participants.

Contact: Jerome Osentowski
P.O.Box 631
Basalt, CO 81621
303-927-4158

Two-Week Permaculture Design Course in Hawai'i

Dates: Oct 27 - November 10, 1990
Location: Island of Hawai'i

Lea Harrison, one of the most dynamic and experienced permaculture teachers active today, returns to Hawai'i this fall between Advanced Teaching engagements in Australia to conduct a full introduction to permaculture design.

The basic curriculum includes:
- Definitions and Theory
- Natural Systems
- Plants, Animals, and Structures
- Water and Soils
- Gardens and Orchards
- Pest Management
- Microclimate
- Shelter and Housing
- Zone and Sector Analysis
- Invisible Structures
- PC for Children and for Groups, and
- A Design Practicum

This course will also emphasize:
- Tropical and Subtropical PC
- Aquaculture and Ponds
- Nitrogen-fixing Trees
- Alternate Energy Strategies, and
- Traditional Hawaiian Crop Systems.

The course fee of $775 includes instruction, field trips, simple dormitory lodging, and all meals for the 14-day program, and is available to registrants paying in full by Sept.15, 1990. Fees paid after Sept.15 will total $825. A deposit of $100 is required. Estimated per person course costs to the organizers are approximately as follows: Instruction $190, Lodging $230, Food $230, Promotion and Admin. $90. Registrations will be limited to 25. Single-day attendance including meals is available by prior arrangement at $65. An experienced kitchen staff will provide three hearty, tasty meals daily emphasizing vegetarian dishes and a variety of regional and seasonal foods. Our cook received rave reviews from the January, 1990 graduates!

The course will be held at residential facilities of the Wood Valley Temple, a Tibetan Buddhist Retreat Center located in the hills above Pahala on the island of Hawai'i. Twenty miles west of the Volcanoes National Park, this subtropical upland area is wooded and cool with frequent light showers. Public beaches and the warm, arid coastal plain are only a few miles away. Hilo, fifty miles to the northeast, is the nearest city with scheduled flights. Contact Permaculture Hawai'i or the course organizers for information about transport to and from the airport.

Contact: Jeff Turner 808-329-2327,
Carl Winge 808-929-9028, or
Permaculture Hawai'i
PO Box 5167
Kailua-Kona, HI 96745

Guatemala Sustainable Development Study Tour
Traditional Mtn. Agriculture

Guatemalan farmers are under pressure to adopt imported fertilizers and pesticides, causing disintegration of traditional culture. After 12 years experience in Guatemala, Aprovecho was invited in 1987 by the Minister of Agriculture to study traditional highland farming and to advise the government on the incorporation of permaculture into national policy.

THE GUATEMALA SUSTAINABLE DEVELOPMENT STUDY TOUR, now in its third year, renews the connection between land and people which exists in traditional societies by using organic farming, appropriate technology, careful land-use planning, and sound economic principles.

This course is for development workers, extension agents, students and teachers of the Third World, agricultural missionaries, peasants, sociologists, and international volunteers. We encourage diversity in age, gender, and ethnic background. For those desiring Third World experience and forming alliances with international participants to extend their and our own effectiveness towards sustainable development, there are possibilities to stay and work in Guatemala.

Dates: February 5-17, 1991

Location: San Lucas Toliman on Lake Atitlan. Within this area of western Guatemala are found arid and humid tropical ecologies, rain forests, export cropping, and subsistence farming. The region is a unique reservoir of sustainable peasant agriculture, markets, traditional villages, and cultures. We will make daily trips to these diverse sites occurring at high altitude, often on precipitous slopes.

Content: Organic gardening methods, solar energy, integrated aqua/agriculture, social and economic strategies, sensible landscape planning, and permaculture.

Fees: $700, includes meals, accommodation, and field trips. Half the fee provides scholarships for Third World participants, encouraging international exchange. Participants are responsible for their own transportation to the site. $100 deposit reserves a place. We will refund deposit only if we cancel the course. Work trades are available. 10-person limit. Please reserve by January 1, 1991.

Contact: Guatemala Study Tour
Aprovecho Institute
80574 Hazleton Road
Cottage Grove, OR 97424
503-942-9434

Keyline Design Workshop

Dates: October 20-21, 1990

Location: Farview Ranch, 20 mi. NE of Marysville, Calif. in the Sierra Nevada foothills.

Speakers: Eric Ardapple-Kindberg, farmer, consultant on Keyline systems, distributor of the Yeoman's Keyline plow, and agricultural innovator; Guy Baldwin, Keyline demonstration project manager, permaculture designer, farmer.

Purpose: To provide participants with the tools for water, soil, and energy conservation, and for creating efficient, highly productive farming systems utilizing Keyline methods.

Topics:
- Absorption-Fertility Cultivation
- Seeding of Legumes
- Crop Rotations
- Grazing/Mowing to promote 'soil climaxes'
- Planting Strip Forests
- Water Storage & Irrigation Methods
- Use of the Yeoman's Keyline Plow in conjunction with other implements in an integrated, diverse agricultural system for profitable small farms.

Contact: Keyline Demonstration
1893 Pleasant Grove Ln
Marysville, CA 95901

Maritime West Coast Permaculture Design Course

Dates: December 1-14, 1990

Location: Lost Valley Center, Dexter, Oregon

Instructors: Michael Pilarski, Friends of the Trees Society Director; and Rick Valley, owner/operator of Northern Groves Bamboo Nursery.

Fees: $600. Pre-registration is $100, of which $50 is non-refundable. This includes all organic meals, dorm rooms, curriculum materials, and field trips. Some work trades are available.

Facilities: Semi-private dorm rooms sleep 1-4 persons with shared baths on each floor. Lost Valley Center is a 90 acre rural conference and retreat center near the Willamette River watershed, in the Pacific Cascadia bioregion, near Eugene, Oregon. It is owned by a land trust, and managed by a small group of partners who host and organize retreats and conferences, network with related communities and organizations, live simply on the land, and manage a reforestation project. They are experimenting with alternative energy resources and non-toxic organic agricultural methods. It is a small village in the lush forests of the Cascade foothills.

Contact: Lost Valley Center
PO Box 111
Dexter, OR 97431
503-937-3351

Allied Groups

Farallones Institute Offers Workshops "Creating and Sustaining Healthy Environments"

Workshops include:
- •Redesigning the Evolutionary Vehicle - August 4-5, 1990
- •Roots of Design - August 25-26
- •Healthy Cities - October 13-14
- •The Body and the Designed Environment - October 20-21
- •Eco-Design - October 27-28
- •Eco-Cosmology - November 10-11, 1990

Contact: The Farallones Institute
55 Gate Five Rd, Suite C,
Sausalito, CA 94965
415-332-ECOS

Fourth North American Bioregional Congress (NABC IV)

Uniting to Heal All Our Relations: Home, Community, and the Earth

Dates: August 19-26, 1990
Location: Lake Cobbosseecontee, Maine
Contact: NABC IV
c/o Gulf of Maine Books
61 Maine Street
Brunswick, ME 04011 USA

For registration after March 15 - a minimum of US$175.00 or the equivalent in Canadian dollars or Mexican pesos. All registration proceeds above the minimum will be used for scholarships. Please give what you can to help others attend.

Practicum in Appropriate Technology and Community Development

Dates: September 4 - October 28, 1990
Location: Lineville, Alabama

This in-depth, hands-on course for people with technical backgrounds focuses on project-driven training in appropriate technologies and sustainable agriculture. Students will learn social and cultural aspects of technical intervention as part of their training. The practicum is designed for individuals who already have some basic technical skills and understanding. Technical projects and areas covered will be based on student interest. The following is a partial list of possible areas:

WATER: irrigation, catchment systems, filtration, purification, pumps, dams.
AGRICULTURE: land preparation, agroforestry, organic farming, mulch, animal traction, animal husbandry, food storage, and preservation.
ALTERNATIVE ENERGY: wind, water, solar, photovoltaics, biomass, methane, alcohol, charcoal
HEALTH & SANITATION: nutrition, preventive health, latrine construction, sanitation, teaching health workers, rehydration, cookstoves

Contact: Servants in Faith and Technology (SIFAT)
Rte 1, Box D-14
Lineville, AL 36266
205-396-2017

A Note from the Publisher

continued from page 3...

economic systems, restore agriculture and commerce based on "solar income", i.e., to create a sustainable culture, requires sustained action of an entirely different sort - much of it involves getting dirt under your fingernails, as well as direct one-to-one contact with neighbors, friends, clients, co-workers, customers, bureaucrats, and the general public in order to work out the nitty-gritty details of implementing permaculture systems on small and large scales.

The events of Earth Day '90 might lead one to believe that people around the world have chosen to adopt an earth care ethic. Yet it is abundantly clear that things are not getting better. Where is the dicrepancy?

Simply stated, not enough people are changing their behavior to a sufficient degreeto reverse the direction that our environmental misbehaving is leading us.

The real work of permaculture design lies in changing this pattern, on an individual, local and global scale - a sort of behavioral engineering that inspires people to "leave the planet better off than you found it". There is a place for Permaculture Activists in virtually any field as long as we keep in mind the critical importance of our work to heal the Earth, and reach out to others to inform, educate and co-create a society that lives for the Earth, and not just on it.

P.S. Please continue to subscribe... and communicate with us (California or Hawaii address until next issue.) I'm staying on as advisor and regular columnist to the PC Activist.

The Bio-Integral Resource Center (B.I.R.C)

A non-profit institution providing education and research on integrated pest management and publishers of "The IPM Practitioner", B.I.R.C. has released a new guide to sources of least-toxic pest control products. "The Common Sense Pest Control Products & Services Directory" lists the latest products used in integrated pest management programs for urban pests such as termites, fleas, rats, and lawn weeds, and for agricultural pests ranging from corn earworms and codling moths to blackbirds and pond algae. Over 200 manufacturers are included.

For a postpaid copy, send $4 to BIRC, P.O.Box 7414, Berkeley, C.A. 94707.

"The Land Report"

Published three times a year by THE LAND INSTITUTE, a non-profit educational and research organization devoted to sustainable agriculture and good earth stewardship.

Brainchild of Wes and Dana Jackson, the Land Institute conducts research into perennial grassland ecosystems. Breeding selected grasses and prairie plants to be both perennial and seed-bearing, their program holds promise for a radical transformation of the way we grow our cereal crops. Land Institute interns are spreading the impact of sustainable agriculture thinking throughout the land-grant college system.

Subscription Rate: $6/yr.

Address: The Land Institute
2440 E. Water Well Road, Salina, KS 67401

"Sensible Agriculture"

A newsletter on low-input practices for farmers, features related news, research, practical information, and advice on cutting farm input costs. The first issue includes results from four on-farm research sites varying from soil tests to cut fertilizer use to fighting weeds by planting rye. Charter subscriptions for 12 monthly issues are $39 from Northcutt Communications, P.O. Box 1921, Bothell, WA 98041-1921.

"Cover Crops for California Agriculture"

A 24-page guide to selecting, growing, and evaluating cover crops. Contact: Publications, Division of Agriculture and Natural Resources, University of California, 6701 San Pablo Ave., Oakland, CA 94608-1239.

Excerpted from "Alternative Agriculture News", v.8, no.2, Feb., 1990

National Audubon Society Seeks Farmer

To oversee and operate their 60 acre working organic farm at Aullwood Audubon Center near Dayton, Ohio.

Contact:
Charity Krueger, Director
Aullwood Audubon Center and Farm
1000 Aullwood Road
Dayton, OH 45414.
513-890-7360.

The Seedhead News

This handsome quarterly reports the activities of Native Seeds/SEARCH and carries a potpourri of cultural stories, book reviews, recipes, and articles on Arid Lands Gardening, Historic and Current Native American Farming, Seed-Saving Information, Genetic Issues, and Collection Trips.

Subscription:
with membership, $10/per yr

Address:
Kevin Dahl, Editor
Native Seeds/SEARCH
2509 N. Campbell Ave. #325
Tucson, AZ 85719
602-327-9123

LETTERS

Barn-Raising

To whom it may concern:

I have time and money and I would like to spend them both learning skills which would be useful in an agriculture-based village. How do I find out where to do this here in America?

Enclosed is a proposal which discusses creating local and regional networks specifically for supporting agriculture-based villages—so people who are looking for villages to support will know where to go to find one which appeals to their individual preferences. So I am also looking for a publisher who supports agriculture-based villages. How can I find out where one is here in America?

I believe there is a need to simplify the complex world of environmental activism. Simplifying our way of life can reduce waste and emphasize what is essential. My suggestion: BRING BACK VILLAGES.

LETTERS

How? Set up local and regional Resource Networks.

Can you help me with the above questions?

Stefan Pasti
43 Madbury Rd.
Durham, NH 03824

Grow-your-own Shelter

Dear Friends:

I recently saw an article in the Whole Earth Review called "Biotecture". And your efforts, along with Bainbridge, and perhaps Max'n'Pat in Austin, Texas have made the notion of growing shelter seem quite practical.

I do Rammed Earth construction and we intend to use all indigenous materials. Well, in looking at our bioregion, if the material does not occur naturally perhaps we can grow it in an agro-forestry program.

I am very interested as a botanist in all the various interfaces between human shelter and the plant world: food, micro-climate creation, decor, materials, production, etc.

Fawn
P.O.Box 202
Ukiah, CA 95482

Green Codicils

To the editor:

I am an amateur enthusiast of permaculture and an expert in the works of trance medium Jane Roberts. I am a trance medium myself for 15 years. The enclosed represents my attempt at integrating the two.

In my opinion their integration will result in a synthesis of such power we will begin to see hope in the future. Otherwise I fear the overwhelming power of machine will culminate in the irreversible destruction of even the prospect of self in life creation.

"THE GREEN CODICILS - A NEW AGE BEGINS

1. The sun is the source of energy for all living things.
2. The building materials of life must be used over and over.
3. Differences in living things provide for the success of all life.
4. Plants and animals live together in areas that meet their special needs.
5. All living things interact with other things in their surroundings.
6. Everything is becoming something else.
7. To survive, everything must fit how and where it lives.

Our first step into the new age of life will be the establishment of an ethic of permanence. Permanence expressed in the form of the Permaculture model of design wherein the life forces of place are integrated with the actions of people to establish sustainable systems of food, energy, and shelter. In practical terms the Permaculture model can be imagined by thinking what it will be like for communities to live within the solar budgets of place. Understood in this manner the rationale for intensive city gardening, solar collectors of all sorts, waste composting systems, and resource efficient, micro-economic structures becomes readily comprehensible.

These new Garden Cities will be areas where a series of new age design formulations will be attempted and experimented with, determining just what is possible in the reshaping of cities according to ecological principles; design requiring differing and diverse new systems of food, energy and transport as these garden cities are integrated within the renewable resource base of the region.

Humankind need make peace with the earth if it desires to remain in life. Only you can do that which will make peace. Will you do that which peace and life requires? Only you can answer.

To make peace with life man need fullfill the promise of Jesus. Give up the earth to serve the meek of the earth. It is your fellow creatures in life who now look to you to answer."

Yours in service,
David Saxton
Susquehana Bioregional Council
P.O.Box 2272
Wilkes-Barre, Pa. 18703

If you have questions comments, opinions, or useful information of any sort to share with readers of The Permaculture Activist, please write to us. Letters to the editor should be short, conscise, and relevant to the lives of other permaculturists.

CLASSIFIEDS

Classified Ad Rates - 20¢/word, $5.00 minimum, advance payment required. Send ad and payment to: *The Permaculture Activist*, P.O. Box 3630, Kailua-Kona, HI 96745. Free 25 word ad with any subscription to the *Activist*.

Books & Publications

TECHNICAL BULLETIN on Gap Mountain Permaculture "Moulder-ing" Toilet: Describes basic functioning, design considerations, and construction details for cold climate privy. $12 postpaid from Dave Jacke, 9 Old County Road, Jaffrey, NH 03452.

How to Build the 5,000 Gallon Ferro-Cement Water Tank that needs no building permit! $10. Ridgehaven, POB 849, Glen Ellen, CA 95442.

Portable dwelling info-letter: about camping, hiking, bicycling, traveling; and living in tent, tipi, wickiup, van, trailer, boat, remote cabin, etc. Reader written. Frank discussions. Sample $1. *Message Post*, P.O. Box 190-PA,

Audio/Visuals

Audio Tapes of Bill Mollison's PC Design Course 25 Tapes in all, prepared by Brett Hudelson. Cost: $5.00/tape + 75¢ postage & handling per tape. For complete index, contact: Brett Hudelson, 147 Central, Ashland, OR 97520

Land

WORKING ORGANIC FARM FOR SALE
On Orcas Island in N.W. WA. Great marketing potential both direct and wholesale. 30 acres with 3+ acres deer-fenced plus mixed nut and forest tree plantings. Approximately 100 varieties of apples, plus pears, plums, cherries, Asian pears, figs, walnuts, chestnuts, filberts, kiwis, grapes, blueberries, gooseberries, currants, raspberries, strawberries, mixed annual vegetables, flowers, and herbs. Octagonal log home with greenhouse, guest cabin, barn with greenhouse and solar drying loft, and chicken coop. A pond and 2 wells with gravity feed water systems for homes and irrigation. A Permaculturist's Dream. Excellent maritime growing climate. For sale by owners. Marc and Tina Robbi, Star Rt Box 135, Olga, WA 98279 ph. 206-376-4322.

LAND TRUST OPPORTUNITY
Two families at Tolstoy Farm interested in buying adjacent property of 308 acres. Seeking three or four additional households to form land trust in Mill Canyon, mostly forested with creek and numerous springs along the canyon sides. Contact Stephanie Kearns, Rt.3 Box 74-F, Davenport, WA 99122.

Additional shareholders needed to share in trust which has purchased 800 acre ranch in Texas hill country. Permaculture community being formed. Contact Scott Pittman 505-982-1262 or Dick Eklund 512-333-7110 or 512-661-7849.

Land

OPPORTUNITY to live in beautiful 360 acre forest in exchange for help on homesteading projects. Write Chip/Clara Boggs, HC 83, Box 402, Coquille, OR 97423.

Help Wanted

Environmental planners to design constructed wetlands for N.P.S.P. control. 713-242-8734 Wetland Technologies Corp, 1831 Pinewood Court, Sugarland, TX 77478

The International Alliance for Sustainable Agriculture seeks an executive director. Contact the IASA, Newman Center at the Univ. of Minn., 1701 University Av., SE, Room 202, Minneapolis, MN 55414, 612-331-1099.

Needed: full-time or part-time worker or partner for herb/flower/vegetable market garden. Housing available in 16-ft yurt. Pay negotiable. Contact: Sharon Casey, Original Thoughts, 1893 Pleasant Grove Ln, Marysville, CA 95901. (916) 679-2729

POSITION AVAILABLE for Apprentice (inexperienced - room & board; experienced - room & board + salary). Integrated greenhouse and market gardens, developing permaculture orchard. Marketing unique salad mix and herbs to Aspen resorts. Beautiful secluded location. Jerome Osentowski, Box 631, Basalt CO 81621. 303-927-4158.

Help Wanted

The Land Stewardship Project seeks a managing director, rural organizer, and on-farm practices co-ordinator. Contact the LSP at 14758 Ostlund Trail N., Marine on St.Croix, MN 55047 612-433-2770

Experimental Central Florida homestead seeks PC-type apprentices, technicians and visitors to assist res. mgt. person create and demonstrate a "green lifestyle"; a wildlife-friendly, comfortable, human-support system. Project starts 4/90. Daniels, Box 813, Fairfax, CA 94930. 415-453-7176.

Nursery Supplies

Fruit Trees - 100 Varieties. Apples, Pears & other fruits. Sonoma Antique Apple Nursery, 4395 Westside Rd, Healdsburg, CA 95448. Catalog $1.00

Travellers

Overnight accommodation for Permaculturalists newly arrived in London. Contact Ian Lillington (in advance if possible), 128 Bethnal Green Road, London U.K. E2 6DG 071-739-2301

Swiss, male, 31, looking for land for Permaculture in oceanic-subtropical climate, for egalitarian work, for village-community, and for a female partner. Undogmatic, strongly nature-oriented way of life, wholesome vegan nutrition, games, funk and fusion music and a variety of other cheerful and relaxing "activities". I'm thankful for every hint to: Vital Scherrer, Rickenstr. 33, CH-8722 Kaltbrunn Switzerland

Free Classified ad for Subscribers: In addition to sending you 4 quarterly issues, we offer a bonus to subscribers: a free 25 word classified ad (or $5.00 off any ad). If you'd like, you can send your ad with subscription payment (or wait 'til later to send the ad). Add 20¢/word if it's over 25 words. You can also use this form to send in a classified ad if you are not a subscriber. Write your ad here:

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SUBSCRIPTION FORM

I want to subscribe to *The Permaculture Activist* and work to develop an ecologically sustainable land use and culture. I will contribute as follows (please check one):

- ☐ $13 per year - Basic 1 year subscription (U.S., Canada, Mexico & Central America)
- ☐ $35 - 3 year subscription (U.S., Canada, Mexico & Central America only)
- ☐ $18 per year - 1 year overseas subscription via surface mail ($23 via air)
- ☐ $50 - 3 year overseas subscription, surface mail ($60 via air)
- ☐ $500, Lifetime Subscription ($700 overseas)

One dollar of each subscription goes to the Tree Tax fund for reforestation projects. Contributions are **not** tax deductible. Please type or print in pen the information below. Make your check payable to The Permaculture Activist in U.S. dollars, and send it to: Subscription Dept., The Permaculture Activist, P.O. Box 3630, Kailua-Kona, HI 96745, U.S.A.

NAME: PHONE

ADDRESS

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CALENDAR

August 11-12. Solar Energy Expo & Rally (SEER'90). Willits, CA. An Outdoor Event featuring Historic and State-of-the-Art Displays of Renewable Energy and Energy Conservation Technologies and much more. SEER'90, 733 So. Main St., Suite 234, Willits, CA 95490, (707)459-1256.

August 11-16 Trees: A Permaculture Perspective. Lake Chelan, WA taught by Michael Pilarski, et al. Solutions to the worldwide forest crisis. Friends of the Trees, PO Box 1064, Tonasket, WA 98855. Details pg. 31.

August 24-31. Permaculture/Self-Reliance Intensive. Spokane, WA. Taught by Larry Santoyo, David Moore, and others. Contact Great Northwest Permaculture, 2073 Marble Valley-Basin Rd., Addy, WA 99101, (509)935-4578.

September 1-3, 1990. Introduction to Permaculture Thinking and Application for Small Property Owners. Nobody's Mtn., Livingston, TN. Contact Sue & Adam Turtle, Rte 3, Box 624, Livingston, TN 38570. SASE, please. Details pg. 31.

September 12-16. Green Gathering 1990, Estes Park, CO. Greening the '90s, Expanding the Green Movement. Contact Green Gathering 1990, PO Box 1289, Boulder, CO 80306,(303)343-8116

August 28-September 6. PC Design Team Road Show. St.Catherine's, ON and Healthcote, MD. Advanced PC course follow-up. Cynthia Edwards, 21300 Heathcote Rd., Freeland, MD 21053, 301-343-0280. Details pg. 32

September 6. Fifth Annual Eastern N. American PC Conference. Heathcote, MD. As above. Details pg. 32.

September 29-30. Garden and Greenhouse Workshop. Basalt Mtn, CO. taught by Jerome Osentowski, Central Rocky Mtn. PC, PO Box 631, Basalt, CO 81621. Details pg. 32.

October 7-20. Drylands Permaculture Design Course. Sunglow Ranch, AZ. Taught by Tim Murphy, Joel Glanzberg, and Larry Santoyo. Contact: Permaculture Drylands, POB 27371, Tucson, AZ 85726-7371, (602)623-0054. See pg 33.

October 19-31. Arid and Mountain Lands Permaculture Design Course at Jerome's Organic Garden, Basalt, Colorado with Jerome Osentowski, Michael Pilarski, Dan Howell, Contact Central Rocky Mtn. Permaculture, PO Box 631, Basalt, CO 81621, (303)927-4158. Details pg. 34.

October 20-21. Keyline Design Workshop. Marysville, CA. Eric Ardapple-Kindberg and Guy Baldwin demonstrate Keyline soil fertility techniques. Keyline Project, 1893 Pleasant Grove Ln., Marysville, CA 95901. Details pg. 35.

October 27-November 10. Subtropical Permaculture Design Course, Island of Hawai'i taught by Lea Harrison, Permaculture Hawai'i, PO Box 5167, Kailua-Kona, HI 96745, (808)929-9028. Details pg. 34.

November 9-11, 1990. Restoration Forestry Conference, Lost Valley Center, Dexter, OR, Contact Lost Valley Center, PO Box 111, Dexter, OR 97431, (503)937-3351. Details pg. 31.

January 13-25, 1991. Permaculture Design Course. Kathmandu, Nepal. See information for INSAN below.

February 5-17, 1991. Guatemala Sustainable Agriculture Study Tour, San Luis Toliman, Guatemala. Contact Aprovecho Institute, 80574 Hazelton Rd, Cottage Grove, OR 97424, (503)942-9434. Details pg. 33.

February 2-6, 1991. Permaculture Designers Convergence. Biratnagar, Nepal. Sponsored by Institute for Sustainable Agriculture, Nepal, GPO Box 3033, Kathmandu, Nepal, ph: (977)(01)524509. N. American Contact: Cynthia Edwards, 21300 Heathcote, Freeland, MD 21053, (301)343-0280. Details pg. 26.

February 10-15, 1991. Fourth International Permaculture Conference. Kathmandu, Nepal.. sponsored by INSAN, information above. Details pg. 26.

February 21-March 7, 1991. Post-IPC4 Permaculture Design Course. Kathmandu, Nepal.. sponsored by INSAN. Details pg 26.

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