

The Final Empire

CHAPTER 20

PLANETARY RESTORATION-WATERSHED RESTORATION

Forage Farming: A Permaculture of the San Francisco River Watershed

To become healed is to become unified with our whole existence. We have dynamic balance within our whole.

We are the world, inextricably. We are three billion years old in this cellular form. We were the amoeba, the reptile, the mammal. We are they and we are our relations the trees and the grass. We are separate within ourselves only in the faculty of intellect.

If a few cells in an injured organ received enough energy that they become motivated to heal, they would have to follow the guideposts, to re-unify with other cells, the organ, the body and the organic environment that the body exists in.

We are all detribalized natives of the Pleistocene family. We are that part of the human family who have lost their way and do not know what or where their home is. Bill Mollison, the leading creator of the concepts of Permaculture went to learn from and help a group who were in a similar situation. In his book, *Arid-Land Permaculture*,¹ he shares the experience and the creative ideas that came about while working with Australian Aborigines. They desired to leave the European culture areas and go back out onto their land. Unfortunately, their native land has become so altered and destroyed that they could not exist by using their own culturally inherited survival skills and knowledge. The ecosystem had been altered by the animals imported by Europeans, which have gone wild, overgrazed and disrupted the natural life. Mollison states that 60% of the plant species on aboriginal lands are extinct; the rest are "greatly decreased." The feral camels, rabbits, cattle, horses and burros have ravaged the landscape. Mollison gives the estimate of 6,000 cattle and 20-30,000 horses on aboriginal land.² Because of the alteration, they asked Mollison's participation in creating a permaculture on their land. Permaculture is an ecologically integrated system of permanent agriculture that would offer the Aborigines a sustainable food basis. Like the aborigines, all of us are returning to the injured earth.

Although the watershed of the San Francisco River is not as pillaged as Central Australia, there is restoration to be done. In order to do this we must reinhabit the earth as our home in a balanced way. Unless we are placing ourselves in a wilderness area or some other unique place, we will find that restoration is called for- aiding the living earth to heal itself.

In a semi-arid region, aiding the soil's ability to absorb water and shading it from the sun is critical. For example the rule of thumb in a semi-arid desert is that fifty percent of water in open surface dams is lost to evaporation! In any area where bare soil is exposed, that soil is being oxidized and moisture is evaporating from it. We must help get the moisture into the body of the earth by helping it get into the layers of organic soil on top of the earth. The premier workers in this area are trees and grasses. Trees are our first consideration because of all of the services that they perform. They create rain by evapo-transpiration. They create moist micro-climates and habitat around themselves. They bring up minerals from the subsoil and deposit this on the soil in their leaves and dead bodies and importantly they shade the soil. The absorbent carpet of live soil is the important element in water retention. It allows the rain to be absorbed and infiltrate as well as holding moisture for the plant community. The initial effort is to slow down the water and help it soak into the earth.

One of the fundamental concepts of Permaculture is to help arrange plants, animals, insects and whatever life one can find in a manner so that each provides services for the other and a self-energizing pattern may be begun. No better example of this can be found than our friends the beavers. The massacred and battered beaver tribe are the hydrologists of nature. Their dams provide services for such a wide spectrum of life that much study would be needed to discover them all. First they dam the headwaters high in the mountains, slowing it down. Their dams back up silt which, when the beaver family moves on, becomes a beaver terrace, or beaver meadow. That is, when the dam finally silts up and dries out, a bench of soil remains which becomes fertile habitat for other species. While the dam is in use the body of water causes the subsoil water level of the whole valley floor to rise, making it available to plants. This is one important factor in the beavers' preparation of their environment for their favorite foods, willow, cottonwood and aspen which proliferate on the underground water. It is important also because all open water needs to be shaded. This prevents evaporation and cools the water so that it is compatible habitat for the local aquatic life. This is another reason why narrow, deep streams and not wide, eroded channels are needed. This growth of the glade creates micro-habitat for other species of plants and animals.

There can be no more dramatic restoration than to help the beaver tribe restore their rightful place on the Watershed. One immediate method is to fence off the riparian habitat from grazing. This does two things. It allows the grass and vegetation to come back so that subsoil water can build up and then seep into the stream bed so that the stream begins to flow all the time, a necessity for the beavers' survival. The second big effect is that without the grazing, the trees and bushes that the beavers prefer to eat can come back. Some shovel work and some hand planting would speed up this restoration. As the sources of live water increase, all life immediately around increases. Animals will be able to spread out more to areas that they formerly could not reach because water was too far. Most of the animals need to come to water at least once per day. By cultivating the food trees in preferred places we can encourage the beavers to stair-step the dams downward from the top of the Watershed. They must begin at the top with their water control project or they will be flooded out lower down.

We should build relationship with the beaver tribe, communicate with them, find out as much as we can about their way of life in order to help them out. They are a

primary totem of the Watershed. We can learn valuable adaptation techniques from them.

Combating erosion is the first line of defense in helping the soil community build back up. As Bill Mollison says, "mulch, mulch, mulch, mulch." Plant trees, plant bushes, plant grasses-cover the bare soil. On the Watershed the natural mixture of native grasses are all but gone on the broadscale but isolated stands can be found. When we are going about our activities on the Watershed we will know each of these varieties and it is a simple matter to gather seed here and there for our inventories.

In addition to helping the beavers, seeding is a primary activity. We collect and plant seed to create habitat for the animals and birds and also we collect seed for our inventories. Plants seed heavily and have remarkably complex strategies to get their seed to compatible habitats. Much of the strategy is based on a huge production, using random chance to get a small percentage of seed to the "right" spot. Humans, because of their mobility and intelligence can be of great help to the plants. We can learn what soil type each needs, we can understand the sun exposure and micro-climate needs. We can plant much more seed than the stationary plant, and exactly in the spots it needs to grow. By helping them, we can create an exponential leap in their growth and thus their aid in the restoration work.

The strategies of seed dispersion by the plant families is a complex art. Plants basically use wind, water, animal and bird dispersal as well as mechanically throwing their seeds out from the seed pod. The basic methods of wind dispersal are by wings on the seeds or pods and tufts or umbrellas as on the dandelion. The second important method of seed dispersal by wind is smallness of seed size, sometimes down to dust. Seeds that are primarily transported by water have generally light hulls sometimes with built-in air pockets.

Animal or bird distributed seeds use two strategies. The first is to entice the creature to eat the seed by surrounding it with attractive fruit or food of some kind. The seed then travels through the digestive tract and is often distributed with its own supply of nutrient (manure). Some seeds cannot germinate unless they travel through the proper digestive system that contains the acids that can begin to breakdown the tough seed coat. The other method of creature transfer is to get the seed or the pod to stick to the hair or feathers. This is done by putting hooks on the seed in some fashion so that they catch on the creature. Some plants do this by putting sticky substances on the seed or pod. There are plants also that throw their seeds. This strategy usually uses some kind of tension in the pod so that as the pod dries, the tension increases until the seeds are expelled. Sometimes the seeds of the explosion variety also have hooks or sticky substances that will adhere to an animal who has brushed against the plant and triggered the expulsion of the seeds.

Dispersing the seeds is only part of the plants' problem. After the dispersal it is necessary that the seeds germinate in the right soil, moisture and temperature. The factor that helps in this strategy is the tremendous production of seed by each plant, especially in arid or semi-arid deserts. In a semi-arid region, such as the Watershed, many of the plants produce seeds that are timed in various ways so that the germination of a seed crop produced in any one year may be spread over a period of many years. This is done by uneven ripening of seeds, uneven shedding of seeds from

the plant and by coating the seeds with coats that have different thicknesses or seeds with different resistances to germination. The net effect of these strategies is to cover the land with millions of seeds. In any one square foot of space there may be hundreds or even thousands of seeds, within and on top of the soil, each waiting its appointed time for the beginning of life. With some seeds it may be many years before they germinate. There are even seeds that remain viable for thousands of years. Some seeds that are artificially germinated have to have a groove put in the seed coats with a file or have to be soaked in acids. This takes the place of years of wear while being transported along with the bottom gravel in a stream or setting out on the surface of the soil exposed to the elements.

The seeds in the desert have the intelligence of which year to sprout. Of the coverage of seeds on one square foot, some may be plants that are very drought resistant. A portion of these seeds would germinate in a drought year while others waited for a later drought year. On the other end of the spectrum, plants that could only survive during the wettest years would broadcast seed, some of which would germinate during a very wet year and some would wait until another wet year came along later. The net effect of this strategy is to insure or attempt to insure that the soil will be covered in all but the most extreme years and it creates a pattern of variety of the vegetation during different years which allows the maximum efficiency of the photosynthetic process of the whole plant cover.

Overgrazing inhibits seed dispersal on the Watershed. When land is grazed too closely the plants cannot make seed because the stock eat the plant bodies. By this simple fact- the lowering of seed production- widespread damage has been done to the efforts of the plant community to perpetuate itself. Inasmuch as seed germination is often spread over a period of years and it takes some years for this natural inventory to run out, this fact is not immediately apparent on an overgrazed watershed, but the health of the area relies on the greatest number of seeds possible, dispersed as widely as possible and if one year or many years of seed production is cut short by overgrazing that lowers the general health of the area.

Reseeding and replanting is one of the most obvious human chores on the Watershed and one of the most important because of human ability to recognize nature's patterns. They can upgrade the efficiency of the plants' random distribution tremendously, and thereby aid the life by multiplication.

On the Watershed, seeds move downward and toward the northeast. Seeds move downward on watersheds because of gravity and water flow. On the watershed of the San Francisco river, the prevailing winds are toward the northeast and that fact provides a general drift of seeding in that direction.

In general, the most efficient grass seeding is to seed the ridges. Grasses generally enlarge themselves in patches or "stands." If they can build up a durable population and create sod they can spread. If the ridges are heavily seeded so that stands can become established, the stands can move off down the slopes under the ridges. This is very important in the beginnings of reclamation when there are limited resources. As heavy grass stands are built up, native seed can easily be harvested from them by hand for further use in the seeding process.

The seeding of grasses can be used strategically both to heal places in danger of severe erosion and in places where the soil quality is being upgraded by forbs and brush. In these areas where the soil can support grasses but there is no seed stand nearby, the humans can seed the recovering spot from their inventory.

As the human life experience integrates with the life of the Watershed the people will be able to know the healing succession of plant regimes as a basic guide. In places where one set of plants are reclaiming, the person will know the next stage of plant life that will move in and that way will be able to seed the area quickly so that the new level of succession can get itself established.

The Watershed has been and is being damaged by the U.S. Government (who own 80-90% of it) by deforestation through logging and (self-admitted) overgrazing. As we establish on any watershed we will be lobbying and working cooperatively with the appropriate "land management" technicians (as long as they exist). As we establish cottage industries and our own beneficial uses of the public lands which enhance the ecosystems, alongside the loggers and grazers, we will begin to exert a force for human maturity, responsibility and sustainable existence by all on the Watershed.

Specific Water Retention Strategies

We have reviewed water retention and containerization strategies of the Nabateans and the Kiva people. These are specific to food growing. There is also the question of broadscale work in the area of water retention that can be done as restoration projects. For these we need to turn to Bill Mollison. The major tome of Permaculture is the book: "Permaculture: A Designers' Manual", by Mollison.³

One revegetation technique that Mollison suggests, is especially useful in floodplains and more level lands. This technique is to cut small swales, which are simply depressions in the ground. A farm implement called a disc is used. It is an implement with a series of plate-like metal discs across it, pulled by a tractor. With this technique all but a quarter section of each disc-plate is cut off. As the row of quarter-discs is pulled along behind a tractor, a grid of small depressions is cut in the soil⁴

The importance of this is that seed ordinarily cannot germinate on bare ground in dry environments. The natural places that are congenial to seed are the small depressions, rocks against which rain has washed a small bit of organic debris, fallen branches behind which organic has collected and other such impediments where wind or water has made any small pile of organic material. This mound of organic can hold enough moisture so that a seed can germinate and there will be enough soil moisture so that it can get its roots down to the soil water before the surface dries. This is the benefit of these pits on the Watershed. The depressions being there in selected places, collecting small amounts of organic and eventually nursing sprouts is a benefit. If hand work is done, a small amount of compost or mulch supplied with seed in the hole, increases the chances of life.

Mollison discusses the Yeomans Keyline System of water management developed by P.A. Yeomans of Australia⁵ One of the central features of this system is a metal shaft similar to a "ripper," pulled behind a crawler tractor, used in the earth moving trade. This shaft extends 7.01 inches to 7.99 inches into the ground. There are a number of

designs of this implement, but all have a foot on the bottom of the shaft, which is pulled through the soil. The shaft holding the foot slices deeply through the soil and the triangular foot is angled, nose down, so that the soil above it is pulled up and a tunnel with an air pocket is created behind it. This implement is used across the landscape much like contour plowing. The implement is put in the ground at the gully, arroyo or eroded ravine bed and pulled along the side of the hill angling away from the stream bed and slightly down downward at the point below the keyline and slightly upward above the keyline. The Keyline is the place where the sharp drop of the hill ceases and the drop lessens and levels toward the valley. These cuts would be made successively down the hillside on each side of the watercourse. The big effects of this are to aerate the soil (the soil community needs oxygen too), allow water to infiltrate and because of the opening up to the air, the soil temperature rises, causing the soil life to increase. In Perma-Culture Two, Mollison says that Geoff Wallace, an associate of Yeomans, has recorded a soil temperature rise of up to 11°C under his reconditioned forest.⁶

Mollison lists some of the reasons that this method builds soil so quickly:

- "- friable and open soil through which water penetrates easily as weak carbonic and humic acid, freeing soil elements for plants, and buffering pH changes;
- - aerated soil, which stays warmer in winter and cooler in summer;
- - the absorbent soil itself is a great water-retaining blanket, preventing run-off and rapid evaporation to the air. Plant material soaks up night moisture for later use;
- - dead roots as plant and animal food, making more air spaces and tunnels in the soil, and fixing nitrogen as part of their decomposition cycle;
- - easy root penetration of new plantings, whether these are annual or perennial crops;
- - a permanent change in the soil, if it is not again trodden, rolled, pounded, ploughed or chemicalized into lifelessness."⁷

Another use for this system is to create the above contour treatment and then space pits along each slice and mulch, hand prepare and plant tree seedlings or other beneficial vegetation. Because of the cut in the earth the new plants will find it easy to insert their roots and stored moisture will exist for them.

A basic aim of the restoration effort is to start the positive cycling toward increased fertility. To establish a small grass-sod stand so that it can spread, to dam up a gully so plants can establish and spread, to plant a mini-forest so it can spread- is a big part of the effort of aiding life and living from the increase.

Among the many specific suggestions offered by Mollison in the Designers' Manual section on "Dryland Strategies" is a method to help nurse trees to maturity when grown on an open hillside. In this method, criss-cross ditches are cut across the hillside looking something like a checker board turned on its corner. At each intersection of the watergathering ditches, a tree is planted with appropriate compost and mulch. The watergathering allows infiltration of enough water to support the beginnings of the new forest. Mollison calls this the "Net and Pan" method and suggests that hardier trees be planted upslope and less hardy downslope.⁸

The Trees

Trees are the major item of life on any landscape. On the Watershed there are forests down to the Chihuahuan life zone and even in that zone, scattered piñon, juniper and mesquite exist on the open hillsides. It is the deforested hills on private land and the damaged areas in the riparian habitat (where much of the private land exists) that will receive the first attention in terms of trees. First we need consider the basic native trees of the Apache foraging system. These are the pin~on, juniper, oak, black walnut and mesquite.

To the Apaches, acorns were a basic staple and their food value and the variety of ways that they can be used must be considered by others. Acorns can be eaten raw, roasted, in soups, and ground to flour for use in baking. There are no acorns on the Watershed that require leaching such as those that grow on the continental coasts.

The piñon nut must also be considered a staple, especially in the periodic years of piñon nut abundance. Piñones would be gathered to roast, make nut butter and to dry and grind into flour. Carolyn Niethammer in her book *American Indian Food And Lore*, which is a fundamental text for this area (and also contains many recipes), says that piñons are a rich source of protein, fats and contain 3,000 calories per pound!⁹

Though juniper has many uses, the only food use is the berries of the one-seeded juniper. These are the type with the white powdery surface which may be eaten raw and are rather sweet though not a good source of bulk food. In the same respect the inner bark of the ponderosa can be eaten. The Apaches toasted it on campfires so that it tasted something like biscuits. This must be considered only a survival food and not a staple. Anyone gathering bark should take care not to girdle the tree (take bark from all the way around it) as this will kill it. At this point we need take only a small experimental sample and then seal the wound with beeswax. (There is the consideration that as civilized people with a life-time of conditioning of soft, refined foods, we can't simply go out and start eating the landscape raw. Good recipes such as Niethammer's book are essential, even crucial. There are also a growing number of Native Southwestern authors who have written good cookbooks based in local, Native foods.)

Mesquite and black walnut both grow very well near water or stream courses. Full size mesquite trees grow now at the San Francisco Hot Springs, toward the bottom of the Watershed and could be cultured easily above without irrigation. The mesquite roots can go into the earth in excess of 150 feet and they are extremely hardy. Black walnuts are more cold resistant and can grow up into the ponderosa zone but they have shorter roots and must live close to stream courses or other sources of water. Douglas and Hart in *Forest Farming*, state, "Good algaroba varieties or cultivars [which include mesquite and honey locust] can yield up to twenty tons of edible beans per acre annually. The meal is an excellent cereal-substitute, superior to common field grains in nutritional content,"¹⁰ Carolyn Niethammer in *American Indian Food and Lore*, states that black walnuts are rich in fat and contain up to 76% oil.¹¹ Local sources say that domestic walnut cultivars can be grafted to black walnut trunks to add hardiness. Walnut cultivars can produce an average of 8,000 pounds of nuts per acre.¹²

There are many tree crops that could be adapted to the Watershed. One can find voluminous listings in references such as Mollison's Permaculture One or the periodical, The International Permaculture Species Yearbook and the Friends of the Trees Society publication, International Green Front Report, of possible tree species that would fit well in the Watershed. We will consider a handful of varieties that can be considered basics to getting edible forests started.¹³⁾ Honey locust, a close cousin of the mesquite are very good producers and live well on the Watershed. There are several of this species at the 5,700 foot elevation on the Watershed that produce well. Both honey locust and its cousin, mesquite, are legumes. All legumes put nitrogen in the soil. Honey locust is considerably more cold tolerant than mesquite and may grow well into the ponderosa life zone at 7,000 feet. Honey locust are useful for their pods, as wind breaks and honey locust, walnut and mesquite produce fine wood. The ground pods of honey locust are rated at 27-30% sugar and the pods and seeds are 16% protein. Honey locust flour is often mixed with other flours because of its sweetness when making breads.¹⁴⁾

There are common nut trees that could live well on the Watershed. Chinese chestnut, hazelnuts, cordate walnuts- a cold-hardy variety of Japanese origin and butternut, could be adapted. The difficult problem of finding sources of cooking oil might be solved by adapting the Indian butter tree, Mowra, Ceylon oak or Malfura trees to the Watershed. The nuts of these species are listed by Douglas & Hart as being high in oil.

A number of fruit tree varieties exist on the Watershed, among them pears, pie cherries, apples and apricots. The Hopis grow apricots on their mesas which are near 7,000 feet and these can be considered staples. Various apple and pear varieties can be adapted by experimentation. Wild plums grow well and domestic cultivars should be a choice. In addition, persimmon and mulberry would do well.

One other native tree should be mentioned and that is the box elder. This tree is a cousin of the maple sugar tree and it can also be tapped for sugar sap. Box elders are living up into the ponderosa zone.

Placing the Tree

On the Hopi mesas we find the people who have the longest record of inhabitation in one place of any peoples in the Southwest. While the Hopi diet is basically the Mayan adaptation, it is almost all rain-fed or dry land agriculture. It is highly adapted to the life of the area where it is conducted. Hopi fields are not randomly placed. The location of the plot is guided by the plant to be grown there. Some plots will be on top of the mesas, some on the slopes, some out on the flats and some in ravines to take advantage of flood plain agriculture. In older times these fields might be as many as twenty miles apart and even today they are often many miles apart in order to take advantage of particular soils, particular sun exposure, water run-off or micro-climate. One of the types of fields Hopis use are literally on sand hills. In certain sandy situations this is a very enterprising method. The sand acts as a mulch. Rain soaks in immediately and if one has located in an area where there is a relatively impermeable layer under the sand, a constant seep of water will exist on the top of that layer which feeds moisture to the plant. If one is in an area such as Hopiland, evaporation exceeds rainfall and minerals and nutrients tend to stay near the surface rather than being

leached toward the subsoil by abundant rain. It is because of this that quite sandy soils, such as at the Hopi mesas, can be fertile.

When we begin to think about the placement of trees, we must realize that trees are the large objects in our permaculture and that where we place them will configure much of what comes later, the wind currents, the shading, the retention of soil moisture, the build-up of organic debris and various other complex considerations. Therefore we must imitate the Hopi in terms of the depth of our thinking about how we begin our system of forage farming.

Permanent agriculture is based on perennial plants and plants that can easily reseed themselves. This is not a farm labor situation. We want to arrange the pattern at the beginning so that the rudimentary ecosystem can sustain itself and "take-off". Then our role is gentle guidance, aid and observation. We do not want to be out in the field with a hoe, struggling to grow European vegetables in an environment where they were never adapted, nor do we want to be out struggling to irrigate a rice paddy because we can't give up our brown rice. Mollison's *Designers' Manual* is excellent in its coverage of concept and placement of trees. After perusal of Mollison and much thought and observation, we can begin to search through the permaculture networks for sources of cultivars to bring in and plant.

Permaculture is not simply the arranging of plants, but is ultimately a design philosophy. The philosophy is to aid the natural life in its innate pattern. While the motive of the culture of civilization is to drain the life system of its energy for profit/growth, the perspective of permaculture is to aid the life system and live from the increase, in cultural stability. In his book, *Permaculture: A Designer's Manual*, Bill Mollison offers a brief description of a complex study. He says:

"Permaculture (permanent agriculture) is the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems. It is the harmonious integration of landscape and people providing their food, energy, shelter, and other material and non-material needs in a sustainable way. Without permanent agriculture there is no possibility of a stable social order.

"Permaculture design is a system of assembling conceptual, material, and strategic components in a pattern which functions to benefit life in all its forms.

"The philosophy behind permaculture is one of working with, rather than against, nature; of protracted and thoughtful observation rather than protracted and thoughtless action; of looking at systems in all their functions, rather than asking only one yield of them; and of allowing systems to demonstrate their own evolutions."¹⁵

It should be apparent as Mollison says, that without permanent agriculture there can be no stable social order. It is apparent also that the earth cannot be saved unless there is a permanent agriculture. Since the industrial revolution the earth and human labor have become a commodity. Unless permanent agriculture practiced by stable populations becomes a reality, the present instability will continue to the end. The end will be a complete exhaustion of the soils and a mass die-off of the excess population. One small example illuminates the historical process. When the one-fifth of U.S.

agriculture based on the dwindling Ogalala aquifer comes to an end in the first part of the next century, the soils will be exhausted and the water gone. A mass population will be dislocated. As long as land is a commodity, those with economic power can obtain it and drain it of its fertility. In socialist countries, as long as mass populations can be shifted on and off of land such as China shifts masses to Tibet and northern Manchuria and Russia shifts masses to the "virgin" lands to be exploited with mass production industrial agriculture, the earth cannot be saved and there can be no social stability. Looked at in this way, we can see that permaculture is much more than simply a new method of horticulture because it means land and culture reform in the most fundamental meaning.

In many areas of the globe there are now no ecosystems or only remnants of ecosystems. Using permacultural methods we can place living ecosystems on the land and begin guiding those systems toward integration with any remaining natural life and toward an ultimate climax equilibrium. The standard is the maximum Net Photosynthetic Production from climax ecosystems spread around the entire living earth. We will be making effort toward balancing the solar energy budget.

A Walk Up the Watershed

The San Francisco enters the Gila river near the small copper mining towns of Clifton and Morenci, Arizona. This is an area of steep and high ridges that run north-south off of the higher elevation Mogollon Rim. This range is also on the divide between the Chihuahuan desert and the Sonoran desert. On down the Gila river, going west, is the Sonoran. From its confluence with the Gila, we follow the San Francisco up through narrow, steep, high-walled canyons. It travels through this range until it opens out into wider valleys some thirty-five miles above, at the natural pools of the San Francisco Hot Springs. The long, winding canyon through which the San Francisco travels in this area is very remote and contains many viable populations not found in abundance in the surrounding area, such as, gila monsters, ring-tail cats, coati-mundis and many species of birds, especially hawks and sometimes eagles. On the canyon walls and in this range of rugged hills, live viable herds of bighorn sheep who sometimes come down to stare at the bathers in the San Francisco Hot Springs.

At the hot springs, the valley widens significantly into the area now called Pleasanton. This area is just at the northern border of the Chihuahuan desert and the climate is appropriate for low elevation berries, fruits and melons. In the early days of occupation a Mormon community had created a rich area of irrigated orchards there but as the anti-bigamy law was passed in the late Eighteen Hundreds they left for Mexico and the orchards deteriorated and are now gone.

The Chihuahuan desert-piñon-juniper ecotone extends from the San Francisco Hot Springs on up to the area now called Alma where the river turns north and begins its travel through another, rugged canyon, which is the crack through the Mogollon Rim that goes into the upper country. The area from Clifton to Alma can be considered base camp, winter camp area, with the higher areas usable more as foraging areas. This would apply especially to the spruce-aspen zone and higher.

There are a number of natural plants that exist in abundance and that could be more encouraged in the southern region of the Watershed. Agaves grow up as high as San

Francisco Plaza just below the ponderosa zone, but they are found in greater concentration much lower. Agaves grow profusely in the region from the San Francisco Hot Springs down to the point that the canyon of the San Francisco joins the Gila, and on below.

Native sunflowers are natural plants that were valuable to the Kiva People and the Apache foragers. They grow up to the ponderosas and in concentration much lower. Their seeds are 50-55% protein and they are rich in vitamin B. The seeds are also 50% oil.¹⁶ If cultivars were interplanted with natural stands, the strain could no doubt be assisted in its value by the interfolding of the variety of genetic strains.

Devil's claw, sometimes called the unicorn plant (*proboscidea altheaefolia*) is a plant with an interesting aura very similar to datura, which grows on the Watershed below the ponderosa. The young pods of the devil's claw may be prepared like string beans and the seeds of the mature pod may be used as food. The seed is rated at 36% oil.¹⁷ The seeds are 27% protein and the oil resembles safflower oil in taste and texture.¹⁸ Gary Nabhan of the Native Seeds/Search seed bank in Tucson says that this plant has a large tuber of which the portion between the skin and the core may be eaten.¹⁹

The perennial cucurbit called calabazía by the Spanish and called Buffalo gourd in English (*cucurbita foetidissima*), is a tough and useful plant which grows well up into the piñon-juniper zone. Calabazía needs as little as ten inches of rainfall per year and grows on abused soil as well as other locations. One acre of this plant can produce 3,000 pounds of seed which will contain 1,000 pounds of vegetable oil and 1,000 pounds of protein meal. The roots of the plant in the same acre will produce six to seven tons of starch. The "squash blossoms" of this plant are also legitimate food. This is a plant that herbivores will not eat, although it has medicinal use for herbivores, such as healing flesh wounds by using the crushed leaves. A closely related plant called coyote melon (*cucurbita digitata*) will produce soap from green gourds and roots.²⁰ Nopal cactus must be considered an important food plant. The elephant-ear leaves of the nopal are good food and canned nopal is a commercial product. The nopal grows well in its large form in the southern watershed and in its smaller forms it grows up into the ponderosa zone. Its gathering zone would nonetheless be considered the lower Watershed. Another nice benefit of this plant is the fruit, (tunas, prickly pears). These fruits are high in calcium. Two tablespoons of this plant contain 48 calories and have more calcium than a glass of milk.²¹

Wild grapes (*vitis arizonica*) may be found up to the fir-aspen zone in rocky canyons protected from livestock. Though now rare, these grapes are very useful foodstuffs. When we are sufficiently familiar with the Watershed and its life, we will be able to locate exceptional specimens of useful wild plants like the wild grape in order to plant shoots of it in likely micro-environments. Taking a lead from our elders in the rainforest we would also be searching for plants that mimic the natural succession toward climax of the riparian habitats in particular and the broadscale ecosystem in general. Most of the riparian habitat would be returning naturally to climax, but those present areas of private property where human abuse has been long, would need intensive help of the permaculture guided succession. It is especially in these areas where we would want to increase the diversity.

There are numerous plant types already existing on the Watershed that have "similar" cousins in the domestic plant inventory. Wild amaranth for example grows very well on the Watershed. The wild amaranth, which grows under good conditions to a height of six feet, has a domesticated cousin that is called alegría by the Spanish people and is a decedent of the grain amaranth of the Aztecs and Mayans. Using the principle of "similar" one would broadcast seed of the alegría as well as the central american cultivar amaranth in spots where the native amaranth grows well. The same might apply to the coyote melons or calabazía and other cucurbits such as domestic melons and squash. Care must be taken because the calabazía is so hardy that it can grow in areas where the domestics cannot survive. This same principle of similars can be used with berry bushes, grapes, plums and even wild onion, as native species of these grow in various micro-environments of the Watershed. By using the guidance of the similars, one is being guided by the natural patterns for each type of plant and it should be cultured in the micro-environment that its relative indicates that it would do well in. This is in contrast to the square field of gardening practice where plants of different species are forced to grow side by side in a single soil and micro-climate, not necessarily to their liking.

The riparian zones, a few other moist areas and some north facing hillsides, are habitats where greens are found in abundance and greens are one of the basic foods of foraging peoples. A very important green is the lambsquarter (cenopodium album), called quelítes in Spanish (this same word is also applied to native amaranth). Lambsquarter, which is a European pioneer plant, is very nutritious and said by Prevention Magazine to exceed in nutritional value, most of the plants grown in European gardens. Volume for volume it also surpasses milk as a source of calcium. Other important greens are the red and yellow docks, purslane, wild amaranth, tumbleweed (russian thistle), filaree, dandelion, spiderwort, tansy mustard and the bee plant. Some of the greens such as dandelion and red dock have roots that can be used for food and can be used medicinally.

As George Osawa, the originator of Macrobiotics says, one should eat from one's watershed in season. With all of the complex chemistries and electrical, temperature and moisture changes, in sum the metabolic changes through the seasons, it seems right that we should be eating the fresh foods as they come out of the ground through these cycles. After the late winter diet of stored staples such as beans, dried fruit and such, with the only fresh green being watercress, one is ready for more fresh food. Tansy mustard it is, with its filaree-like, lacy leaves and familiar yellow flour. It is the first edible green that sprouts in the spring. It is a bitter green, but with an Italian recipe one finds it more than palatable while waiting for the wild amaranth (amaranthus palmeri). As one makes do with the tasty amaranth, others come up late in June and July with a rush so that there are many choices. By that time the tansy mustard is long gone, the amaranth too large to be palatable, but there are lambsquarters, dock, filaree, and so forth.

CATTAIL ARROWLEAF POTATO

Cattail and tule potato, which tend toward being autumn foods, except for the green shoots on the cattail, are important food sources of the riparian zone. The cattail exists well up into the ponderosa zone as does the tule potato or arrowhead (thus called because of its arrowhead shaped leaf). As the beavers are re-introduced to the lower

part of the Watershed, the resulting fertility in that zone will sponsor many water adapted and meadow foodstuffs both directly such as these two plants and indirectly by the environment that is created which produces homes for the animals and birds.

The roots (or rhizomes) of cattails equal ten times the average production of potatoes per acre. Niethammer says that when reduced to flour, cattails produce 32 tons of foodstuff per acre which is greater than wheat, rye or other grains. The food value of the root flour is equal to corn or rice. The pollen of the tail contains protein, sulfur and phosphorus. The rootshoots, the tips of the new leaves, the inner layers of the stalk, the green bloom spikes and the seeds are all edible.²²

This inventory of plants that exist on the Watershed is a listing of the most obvious and productive staples. There are many other plants and some of these others have food or spice uses. There are still many other uses such as gums, oils, materials, medicines and so forth that we will adapt to our needs. We must not forget the summer gardens in the high forest where any Andean crops such as quinoa and potatoes would thrive.

Also in these high foraging regions are useful items such as the rose hips and the tremendous crop of mushrooms of all sizes and descriptions. With civilization and private property, plants are made to grow in any area where people happen to live. On the Watershed we will establish a metabolism in which the staple crops are grown where they thrive and then barter can occur between the regions. A metabolism would be created so that everyone receives what they need.

Examples of other useful self-sustaining perennial plants would be comfrey, strawberry, asparagus, globe artichokes, jerusalem artichokes, gooseberries, currants and sloe berries. Jerusalem artichokes especially, flourish on the Watershed and would grow well on beaver pond banks just behind the cattails which root under water. Watercress is a local plant that grows well in the waterways. Watercress is a rich source of Vitamin E. Watercress dried, contains three times as much Vitamin E than does dried lettuce leaves.

What is being suggested on the Watershed is not European "gardening" but the culturing of the Watershed to add to a permacultural lifestyle. Nonetheless given the success of the subsistence styles of both the Kiva People and the Apache on this same watershed, the traditional annual plants of corn, beans, green chiles, amaranth and squash of the region should be included in any inventory of survival. The Hopi grow at least 18 varieties of beans and 20 varieties of corn where they live and some of their villages have been standing there for at least a thousand years. This kind of stability is hard to deny and the food that sustains them is of high value in desert agriculture.

This inventory is not exhaustive and will be added to by the experience of those who adapt. It is meant to indicate the sound nutritional basis of the lifestyle being suggested. As experience and observation progress, the inventory of valuable perennial and self-sustaining plant species increases, as well as transformations in the life style which are assumed by the principles of the pattern of life.

Diet isolates or integrates the human and human culture with the life of the earth as we have seen. Either humans adapt to the life of the earth or they spend their lives in conflict with the forces of the life of the earth. An appropriate example is the grasshopper abundance (which some biologists argue is caused by overgrazing) that has occurred on the Watershed the past few years. Two forces are in conflict with the grasshoppers. The people who raise European gardens are in conflict with them and the herders are in conflict because they fear the grasshoppers will eat the grass. The herders have convinced the government to come in and poison them by spraying insecticide, broadscale, thus killing an estimated 80% of the insect community. none the less, the natural life benefits from the abundance. The turkeys love grasshoppers and will eat great amounts of them but of course the turkey population is only a remnant of the former bands that existed on the Watershed. The areas of greatest grasshopper abundance occur in places colonized by the humans on the flats and lower elevations. This keeps the turkeys away because in their culture they are taught to fear humans. Other animals also eat grasshoppers. Coyotes, skunks, birds of various kinds and the host of small insectivorous animals such as rodents all gain. Humans could easily avoid the conflict with the grasshoppers by culturing the turkeys and eating turkeys.

The idea that all natural animals instinctively fear humans is as old as the empire. It is not true, as is shown by explorers who go to the remote territories where humans with guns have never been seen by animals.

People that keep domestic turkeys in areas where naturally living turkeys exist, find that the natural turkeys will call to the domestics, they will come down to meet them and if they are fed a little, they will become quite friendly (provided there are no "domestic pets" around such as cats or dogs). The permacultural environment would provide feed for the turkeys and they should be encouraged to be around areas of human habitation.

To coax a few occasionally into a small, quiet, enclosure trap so that the energies can be shared would not be at all unprincipled. Animals fear humans because humans frighten them with loud noises, such as guns, and humans chase them and frighten them in other ways. There is no reason that animals will not remain around humans if the humans can only become sensitive to the animals' needs. Quiet enclosure traps are a perfect way to share energies after having improved the region so that the animals' lives are also enhanced. The Kiva People kept turkeys and some herded them, often sending young people out daily with the herd so that they could graze in the hills.

The point is, that if the survival culture adds to all of the life of the Watershed and devotes its energies to the general fertility, then they can establish a planetary diet wherein they eat everything possible. If one helps a grove of wild plums and the deer come and eat the plums, then eat deer. If one grows corn and raccoons come and eat the corn, then eat racoon. If the frogs hit the top of a population cycle then eat the frogs or eat whatever eats the frogs.

The humans are the omnivores. They can manage their diet to help harmonize the cycles and do this with intelligence. Within the life of the earth, the whole conditions the harmonization of individual cycles. The humans stand, nutritionally, in wholistic relation to the life, in that they have the greatest diversity of nutritional needs and the

greatest ability to span the nutritional spectrum of any other animal. This is the reason that they can and should maintain a wholistic diet. They should eat everything possible because that is the pattern that nature points to; toward the optimum level of health through diversity. It is diversity that offers the greatest stability for the human family.

The elk, the bighorn sheep and the pronghorn have been the principal grazing animals on the Watershed in the recent past (since the Pleistocene die-off). Of these, the pronghorn must be considered the premier grass grazing animal. There is grass on hillsides and in other areas but the role of this grass is crucial to the maintenance of life of the soil and a confined-annual grass- seeking animal such as a cow should never be allowed on it. Even the large grazers of Pleistocene times would not be found normally in anything other than the open flats because their defense against the grizzly and the large cats is herd formation and running. This cannot be done on a bushy hillside or other broken country (where the most danger from stripping the grass cover exists). By introducing the cow and the sheep, the empire has struck at the most vulnerable point of the semi-arid ecosystem. The skin of grass must be saved at all costs.

All the herbivores on the Watershed, both the grazers and the browsers are edible. As has been argued, the natural mix of animals, bighorn sheep, rabbit, pika, elk, mule deer, white tail deer and even the peccary- who are omnivores but depend heavily on vegetable matter, and bighorn sheep can sustain much more population without damage to the Watershed than a smaller number of the domestic cow, horse, goat or sheep alone. Part of the restoration task will be to actively seed and plant with the needs of these animals in mind and actively lobby with the government managers (while the government can still hire managers) to stop the overgrazing of the forest and grasslands of the Watershed.

Ringtail, racoon, coati mundi, and gila monsters reside in the lower Watershed and spread throughout the Watershed are badger, skunk, mountain lion, bobcat, many types of bats, long tailed weasel, bears, gray fox, coyote, shrews, voles, rodents, squirrel, gopher, prairie dog, mice, woodrats, porcupine, ring-neck pheasant, quail, grouse, peccary, muskrat, and turkey. These animals have varying degrees of "palatability."

In Pleistocene culture, "hunting" is a spiritual act. One does not so much go hunt for and find an animal, one participates in the spirit of the greater life and by that, one is "presented" with the animal. A great hunter often is not one who is strong or canny but one who has the appropriate "medicine."

Silberbauer, who lived with the G/wi, describes their hunting. After explaining the stalking and positioning, he points out that the final target in the herd is chosen according to something that he uses the english word "personality" to cover. After the "personality" is taken into account, that choice is targeted and the arrows let fly. Those who have observed the moose herd, wolf pack relationship have implied that there is some similar kind of unconscious communication also that takes place between the hunted and the hunter.

In this vein, Mollison speaks of the natural way that the Aboriginal people integrated into the whole in times past. He says:

"The 'tameness' of all animal species, bird and mammal, in early explorations also suggests that the aborigine moved amongst his food species more as a herder amongst a flock than as a hunter feared by all other species. Aboriginal Tasmanians lived in small tribal territories only a days' walk across, and resided there for some 20,000 years before the whites came. From such a long period of control and selection, each region was (could we have understood and had we asked) a highly-evolved permacultural region sufficient to sustain tribal life indefinitely."²³

Even though we may talk of eating them, that does not take away from the respect that we have for each life form. We hope that the rabbit, the deer and the lambsquarter have a full and abundant life, not that their death should be prevented. All individual biological forms change and cease to exist. It should be our focus that the remains make a beneficial contribution to some other lifestream in the great circulation. Everything is food and everything is excrement. All energy flows and transforms. In an emotionally positive culture we can avoid the pitfall of the familiar focus on death prevention and shift our view to life expansion and enhancement. The use of all of the techniques that have been discussed; permaculture, those which were used by the Nabateans and the Kiva People (and some being used now by Zuñi and Hopi) will allow further diversity of the Watershed. The waterspreading, the terracing, the floodplain agriculture can all find their uses within the varied topography. As the new culture, cultures all life, whichever can flourish in whatever spot at whatever time, the life for all and the food for all will increase. This will make a more fertile place for the animals as well as uncovering the possibilities of allowing formerly unknown wild species the possibility of entrance into new niches because of the increased fertility and diversity, in addition to the new life forms deliberately introduced and integrated into the system by the new culture.

The Habitation

The tendency in civilization is to build artificial environments and then live out our lives enclosed and conditioned by them. The tendency of people and cultures that live in balance with the life of the earth is to build shelters from climatic extremes and live on the earth.

The earth sheltered human habitation enjoys a long tradition on the Watershed. Even the Kiva People build their most sacred dwelling, the Kiva, under or partially underground and the housing that they build seems to rise right up out of the earth, being built either with adobe or with stacked stone.

The earth sheltered design is the survival dwelling. A properly constructed earth shelter maintains a constant temperature right at fifty-seven degrees, at the latitude of the Watershed, meaning that it is necessary only to heat it up ten to twenty degrees to have a comfortable environment. This has a very important aspect. Even if there is no heat in the dwelling a human will not freeze. Unlike many types of design, one will survive.²⁴

An earth shelter can be created from local materials if necessary. With timbers, rock, adobe bricks, clay and soil, a shelter can be constructed that will be perfectly adequate. Another important consideration in shelter design is that the elements of the design reflect implicitly the culture of the designer. It is no accident that just to the south of the Watershed, in Mexico, housing is designed with high, enclosing walls around them that often have broken glass imbedded on the top of the wall. Sharing is not a fundamental pattern in a country of great disparity of wealth. Where one does not mean to share, it is good to wall oneself in and the poor out.

Difference in design can be seen also between the sparsely populated pit house dwellers, the concentrated population of the Kiva People and their communal housing and the tipis and brush wickiups of the Apaches. Each design reflects significant conditions and lifestyle of each culture.

In present society, one of the considerations is the nuclear family. Housing is designed basically for the couple and their two point six children. The grandparents are not designed in, nor are the married children.

In our new culture with the choice of extended marriage and family, the dwellings will, of necessity, reflect the unity, relationship and sharing of energies of that culture. Ideally, individual diversity will be reflected in each individual having a private space, with the communal family space centered within these smaller spaces. Another important element of the design allows exposure out onto the earth rather than an enclosure from it.

In some countries where earth shelters are used an open patio is used, which is also underground. This is indicated in Figure #12 where a fire pit is placed. An horno, an adobe oven could well be placed in this patio also. It is envisioned that the terracing behind the shelter would be for plants that would be hand watered from the cistern.

One of the things that will begin to bring human community back into natural sympathy is the principle of sharing of energies in land ownership. Though it is absurd to think that a mere human could "own" part of the universe that they did not create, it is currently a practical reality because of the enforced social definitions. Communal ownership or land trust can restore the land toward its natural unity. Taking down the fences will assist the circulation of the metabolism to come back to a healthy level.

The Mattole Watershed: One Example of Restoration

The Mattole watershed is located on the coast of northern California in redwood-douglas fir-hardwood forest region. The Mattole river drains an area of the coastal mountains and empties directly into the Pacific Ocean. The nearest sizable town is Garberville, California. The area, like the entire coast, has been substantially logged and roaded, though the local people are actively attempting to save the last of the native forest which stands at about 10% of the original.

As in many areas, the destruction caused by "resource extraction" has had a profound effect on the ecology of the area. The hydrology of the watershed has particularly suffered. Resource extraction has caused silting of the streambeds of the river and

tributaries and also the widening of the river. which exposes it to the sun, heating it up and in areas, actual landslides have swept into the river due to poor engineering of road cuts, clear cut logging and other abuse.

The Mattole people are networked through the Mattole Restoration Council.²⁵ The Mattole Restoration Council is made up of many other groups and networks, such as the Mattole Coordinating Council whose members are the Environmental Protection Information Center, the Mattole Soil and Water Conservation Committee, the Upper Mattole Property Owners Association, the Mattole Watershed Salmon Support Group, the Mattole Watershed Taxpayers Association, the Redwoods Monastery Community, the Coastal Headwaters Association, and the Sinkyone Council.

The efforts of these vital groups are spread over the whole watershed. The Mattole Forest and Range Lands Cooperative (soilbankers) has worked to inventory the remaining native forest, monitor logging plans and participate actively as work parties on erosion control projects. They deal as a citizens group with the timber industry, state and federal agencies. The Mattole Watershed Salmon Support Group, in one of their projects, organized the California Coastal Conservancy, the Redwood Community Action Agency and the county, to fund a bank stabilization project (riprap with wire netting over rock) which repaired slides caused by poor road construction and other abuse. The effort was to stop the most serious erosion problems.

Another exemplary project of the Salmon Support Group is the study of a large slide of a hillside into the Mattole river. To help fund this year-long study of the slide with constant visual, photographic and measurement observation, the Salmon Support Group corralled the General Services Foundation, Redwood National Park, Philip Williams and Associates, Department of Water Resources (Calif.), and the Redwood Community Action Agency to assist with funding.

A locally controlled high school exists in the area called Petrolia High School. The curriculum emphasizes a strong academic program but also has teams of students who conduct their own restoration projects under the auspices of various local groups.

Like the buffalo of the Plains of old, the migrations of elk and deer through the Mogollon Rim country and the migrations of the Caribou in the north, the migrating life of the Mattole is the Salmon. Though fisheries are greatly reduced from Mexico to Alaska, there exist still, some populations of steelhead, silver salmon and king salmon on the Mattole. After their well-known travel from the mountains to the sea, the fish return to the tributary of their origin to spawn. Each of these fish species need different size gravels to spawn and these stream-bed areas exist in scattered places in the watershed. Because of logging and other "developments" many of these areas have been silted over by erosion material or the tree canopy opened up so that the water is too warm.

These species of fish function as indicators of the health of the watershed. Much of the restoration is done with these indicator species in mind. If the watershed is restoring so that the fish can come back, then it is safe to assume that the whole is regaining health. The Salmon Support Group organizes many people to help monitor the numbers and condition of these fish populations. One of the creative efforts of this

group is to catch the returning salmon as they enter the river mouth. They then physically transport the fertilized eggs up to the headwaters, past the destruction and silt so that the fry will have a chance of life. The group says this allows a better than 80% survival rate from egg to fry and involves populations of in excess of 100,000 fry.

The people of the Mattole River Watershed are a developing psycho/biological community. Their creativity extends to such things as their local dance group who have created performance that expresses the watershed and selected species within it. This dance group of exceptional choreography and costumery, number approximately fifty people. They have toured the major cities of the west coast as a professional dance troupe and have received rave reviews.

Although this is a brief look at one watershed, it helps point out the reality of what is happening around the U.S. and around the world in different variations. Communities are living on watersheds and communities of various types are involved actively in planetary restoration.

When one looks at the scope of activity planet-wide, one realizes how vast is the movement toward planetary healing. Since the sixties, the direct involvement of human life toward personal/spiritual integration with cosmic life, has exploded into a multitude of paths many of which, correctly or not, are generically grouped under "New Age." There are also Pagan groups that have grown active as have Christian groups, especially the Christian base community movement. Among native people there has been a resurgence of activity in Native spirituality and life ways. In all, awareness of spiritual/non-material realities has increased much.

The movement of physical, emotional and mental healing that relies on removing blockages to positive energies, is travelling under the banner, "Wholistic Health" or "Alternative Medicine."

This movement with all of its modalities such as re-birthing, Reichian therapy, massage, accupressure massage, acupuncture, reflexology, hypnotherapy, primal therapy, macrobiotic and many others are matched by the growth of support groups that travel under various labels and all are a significant gesture toward healing the personal and social isolation of all involved.

These movements are matched by the growth in the interest in physical, emotional, mental and spiritual balance that have come from the monasteries of the Far East. Disciplines such as Tai Chi, Kung Fu, Akaido, Karate and the rest are at base, disciplines of spiritual balance.

In the past thirty years many new forms of social relating have emerged that are outside the hierarchal form of civilization. Affinity groups, collective ownership, a renewed interest in the Mondragon Plan- the cooperative economy of the Basque region of Spain, the "anarchist" production groups functioning in some other areas in Spain, the LETS system, a local currency/economic plan, and many others. These show the desire of many of us to have some real relationship to the institutions within which we live out our lives.

There are many tens of thousands of people just in the U.S., living in the old line religious communities such as the Hutterites and Amish. There are also many living in communities that may be said to have descended from the hippies of Haight-Ashbury and there are further thousands living in what are loosely termed, "New Age Communities." Information concerning the hundreds of these groups can be found in the New Age Community Guide. This document can be obtained from Harbin Springs Pub., P.O.Box 1132, Middletown, California 95461, \$7.95+postage.

Along with these developments have come the revolutions in housing design and alternative energy. In 1950, maybe one person in ten million realized that simply sitting a house in relation to the angle of the sun could have an effect on heating bills, comfort or standard of living. Though the elites of the trans-nationals have tried to buy-out and stifle this field, we can now obtain much useful information about alternative design and energy.

One of the most significant movements of recent years has been feminist awareness. From the realization that brassieres were a kind of chinese foot binding, a part of the feminist movement has begun to emphasize eco/feminism and offer a serious challenge to the very foundations of patriarchy, ecodestruction and militarism in the empire. The missing female perspective through the succession of empires has allowed the growth of the crippled and distorted activities of science, religion, economics, culture and the basic way that the conditioning of imperial society causes us to see the world. The women who are struggling up through many of the mass institutions are making quantum changes in the perspectives of society. In many areas what women are pointing out seems quite simple and plain to everyone, its just that there have not been women around to point that out. Those eco-feminist women who stand outside the tumor body of empire are leading the movement toward planetary healing. It is a nurturing activity and we can expect women to lead it.

In response to the starvation of millions and the destruction of life, the alternatives to industrial agriculture have exploded in size and number. The field of Permaculture is ablaze with activity. If one looks at a Permaculture publication such as the International Permaculture Species Yearbook, it becomes clear that this is a planetary movement. In the directory section are listed ten Permaculture publications. Eighty-five Permaculture centers are listed that exist in Sixteen countries. Ninety-seven bioregional (watershed) groups are listed in seven countries. Eighty-five green and green oriented groups are listed in sixteen countries. One hundred and eighty-eight alternative economics groups are listed in twenty-two countries. Permaculture related organizations and publications number fifty-nine in forty-four countries. Centers where one can actually obtain seed or plant cultivars important in Permaculture work, number sixty-five sources in eleven countries.

Since the atom bomb in 1945, an awakening has taken place. A small percentage of the human family has awakened enough to intuitively go in the wholistic direction needed. By doing this (completely intuitively and with out top-down organization) we now have the framework of tools, knowledges and methodologies that we need to create a new culture and put it on the ground.

On the Watershed: Some Practical Considerations

Looking at the functional situation of extended family in industrial culture we can see the strength that it has, in economics, social health and in the storms of the future. When we look at the prospect of buying land, we begin to understand the functional position of the masses in empire. For a working class family to buy land is all but impossible. Buying a piece of land for a family is expensive but if many families go together and buy a large piece of land, the price per acre goes down radically. We can easily buy land by all of us putting our small bit into Trust and have the trust buy the land. The Trust as it grows can then buy more land. Most of us are leaking energy to landlords, food distributing systems, clothing manufacturers and such simply from inattention or because our own social institutions are undeveloped. We are all going to be paying someone for rent, food, clothing and heat. We can divert our economic energy from the sharks and use it to energize our own institutions that have survival value.

We are in the practical situation of needing to still have a connection with the money economy as we position ourselves in terms of cutting our outflow by owning our land, growing the bulk of our own food and communally putting up our own shelter. Unless we are in unique circumstance, we will have to deal with money (at least until the world debt bubble pops).

Most watersheds we now, or would in the near future, inhabit, are in remote areas. Because of transportation costs and the world energy situation we would want to be producing small items of high value in our cottage industries. We have discussed the Apache foraging system with its agave, prickly pears, yucca bananas and piñon nuts. Each of these items can be considered rare delicacies. Agave butters, prickly pear jelly, yucca banana butter and jelly and piñon nut butters, possibly flavored with natural herbal flavors from the Watershed, would compare well with any delicacies sold in any airport gift shop in the world.

The possibility of grazing bees is very attractive. By knowing the land well, it is possible to move hives to specific wild blooms in the high mountain meadows. This cropping would allow the sale of "wildflower specialty honey" (and it would also escape the northward migrating "killer bees" who can only live in lowland, warm regions).

Another splendid idea is suggested by John Kimmey who, with the direction of the Hopi elders, organized the native seed bank, 0, located in Santa Fe, New Mexico. The Center was organized to collect and save the remaining seed varieties held by Native Americans in the Southwest. Kimmey suggests that one can make a middle-class income by growing out selected varieties held in the seed bank. The seeds in this bank are some of the few places in the world that the old, hardy, pest-resistant and drought resistant seed can be found. Some of the varieties are dry-land adapted seed strains. Although the varieties exist in the seed bank, they are only samples. Someone must "grow them out" so there will be quantities for international aid organizations.

Third World development groups have realized that the green revolution as it is practiced in some parts of the world is not going to help the people. In desertified areas or where they cannot afford to buy all of the factors of industrial agricultural

production from the First World industrialists, the people need this seed. Growing out this seed and selling it to international aid organizations can provide available income.

Time To Move

This type of consideration can be applied to many watersheds. What we want is to return to the earth. We want congenial community with real friends and family who have no motive to be in conflict with us. We want all of us to be able to sit in the hot springs pools in peace. We want to be able to sit in our comfortable hand-made homes in the winter on the lower part of the watershed, doing our crafts or other creative work. In spring we want to go with our new health and strength, out onto the watershed to gather the first greens and other foods. In summer we want to be in the beautiful high mountain meadows grazing our bees or gathering. In the fall we want to be able to come down into the chaparral, each person of the community, including the older children, holding a deer tag, an elk tag, a turkey tag, a pronghorn tag, for our winter larder. The public lands as we know, are there for the exploitation of the welfare ranchers and the timber elite, but just the same the public land agencies are eager for other citizens to find ways to generate income from the land and from beneficial use. The agencies would encourage gathering for cottage industries.

We know that the Greenhouse Effect is progressing. We can measure the carbon dioxide increase. We know the ozone layer depletion is progressing, we can measure it. Even the industrial elite does not deny this. We simply cannot predict what the effects will be (even with dozens of computers to model what little information we have). Our work on our watersheds with seeds, permaculture and natural plants could enable us to be of some assistance to the human family and to the earth, as the ecosystems are impacted. This is wisdom, this is being responsible to life and the unborn. Now, those who act in a positive way to realistically help life, may be looked upon as fools for not grabbing what they can while it lasts, but as all of the exponential curves come together, some of those who have acted in a mature way will be there to point the remaining children toward a future of positive life.

Creating the Future

The crisis of our era offers us paradise. It offers us the opportunity to shed the tensions and dangers of civilization so that we may create a new world. Creating new culture is not an activity of gratification deferred in pursuit of a distant goal but of immediate increase in the satisfaction of life. Rather than watching helplessly as victims of historical trends, trapped in a boring and dangerous mass culture, people who step out and begin to create answers are living "real life." There are hundreds of thousands involved in wholistic health. There are tens of thousands of people already in the United States who are living in intentional communities and permaculture projects and bioregional groups are wide-spread.

Our task is to recreate paradise. There is no other way. We must restore the life of the earth and in order to do that we must have a benign, creative and potentiative culture. When we create nurturing culture, our children will have more opportunity than the lock-step of civilization, in which to further the human potential. We will become more creative, more conscious and more nurturing of life.

Gary Nabhan relates a Papago story about Coyote stealing some corn and deciding to grow his own. He ate most of the seed then threw the remainders along an arroyo. He slept all through the growing season and when it was harvest the corn turned out to be coyote tobacco, a wild plant. The problem according to the Papagos was that Coyote did not know the proper songs to sing to the corn, so it could not grow properly.

The story points up a neglected fact of the Pleistocene Native American culture and most other Pleistocene cultures -that they were cultures of song and dance. These groups had rich cultural content. There were songs for everything, for all of the natural acts. The people were given life and then gave that beauty back to the cosmos in song. They began with the real life-and extrapolated the song from there, out into the universe and into the immaterial. The song was grounded in the beauty of the earth and its forms of life.

We are forced to choose a life of beauty and a life that aids the whole.

We are embarking upon a transformative course, the inversion of the values of empire. When communities exist at the top of watersheds and the water running from them, downhill, is pure, then we know that a cosmically resonant human social pattern exists.

No studies are necessary, no protracted discussions are needed, human society is out of balance with the life of the earth and human society needs to regain balance. If our daily efforts are substantially directed toward regaining that balance then we are on the path to paradise.

NOTES

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4 *ibid.* p. 327.

5 *Water For Every Farm/Using the Keyline Plan*. P.A. Yeomans. Second Back Row Press Pty. Limited, 50 Govett Street, Katoomba, 2780 Australia. 1978. p. 29.

6 *PERMACULTURE II: Practical Design and Further Theory in Permanent Agriculture*. Bill Mollison. Tagari Pub. P.O.Box 96, Stanley, Tasmania 7331, Australia. p. 29.

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13 *The International Permaculture Species Yearbook*. Dan Hemenway, Editor. 7781 Lenox Ave., Jacksonville, FL 32221.

International Green Front Report. Micheal Pilarski, Editor. P.O.Box 1064, Tonasket, Wa. 98855. (\$7.00 + postage).

14 Hart & Douglas, *Forest Farming*. op cit. pp 161

Mollison, *Permaculture One*. op cit. pp111.

15 Mollison, *Designer's Manual*, op. cit. pp. ix,x.

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17 *ibid*. p. 94.

18 *Farmland Or Wasteland: A Time To Choose*. R. Neil Sampson. Rodale Press. Emmaus, Pa. 1981. p. 212.

19 *Gathering the Desert*. Gary Paul Nabhan. U. of Arizona Press. Tucson. 1987. p. 138.

20 *ibid* p. 170.

Niethammer. *American Indian Food and Lore*. op. cit. p. 86.

21 Niethammer. *American Indian Food and Lore*. op. cit. p. 11.

22 *ibid*. pp. 88,89.

23 Mollison. *Permaculture One*. op. cit. pp. 10,11.

24 *Earth Sheltered Housing Design: Guidelines, Examples, and References*. prepared by: The Underground Space Center. U. of Minn. Von Nostrand Reinhold Co. pub. New York. 1979. pp. 51-94.

25 Information can be obtained from: Mattole Restoration Council, 3848 Wilder Ridge Road, Garberville, Ca. 95440.