030806 Permaculture Thinking: An Example Kudzu Paper

The following is an example of how we think about things in permaculture. It is not a sample permaculture design, but a sample of how a permaculturist looks at a situation. Coming from an abundance perspective, we can create abundance. Though people have ordered a number of copies of this paper, we have never heard of anyone tapping into this abundance. Sometimes people in this course live in areas where they could make practical use of these concepts. (I'd be interested in serving as a consultant on such a project, though this is not required.)

Omitted from this transmission is the list of people with special knowledge and skills who are willing to work with me on such a project. That is more for when we thought to apply for financial investment. I'm still on the margins of Kudzu territory. We have managed to get kudzu established in places here, but in places it has failed.

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Kudzu Utilization Project Concept Paper

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Context

A rampant vine commonly known as kudzu (*Pueraria lobata*) infests large areas of the Southeast United States. Kudzu grows with amazing speed. In the northern part of Georgia, where we formerly lived, the vine grows one foot daily during the warm season. In areas where the climate is more favorable, the rate of growth is about two feet daily. Kudzu vine has overrun farms (which may have been worn-out anyway in many cases) and smothered all existing vegetation, including trees. Likewise the vine has over-topped tracts of forest and killed the trees with its shade. Efforts to "control" kudzu are local and mostly either endless battles or ephemeral gains.

In much of the region where kudzu is rampant, considerable poverty, unemployment and underemployment exist. Malnutrition is often a problem.

Permaculture

Philosophy

The Kudzu Utilization Project concept grows out of a design philosophy called "permaculture." Permaculture emulates ecosystem design principles to design provision of human needs and amenities: food, water, shelter, energy, income, community, aesthetics, etc. By applying ecosystem design principles, permaculture designs achieve the same efficiency and elegance that enables mature ecosystems to thrive and make maximum use of available resources in the face of often adverse and sometimes calamitous circumstances.

Permaculture also contains an ethical component--permaculture designers do not prioritize between profit, people, and the Earth. As part of the Earth, the well being of people is intimately involved with the health of the planet. Because environmental destruction is virtually ubiquitous, permaculture designs invariably include activities that restore natural systems. However in permaculture design, the restoration is always an aspect of self-serving human activity. Besides its design philosophy and ethics, permaculture has accumulated a large tool box of basic strategies and particularly appropriate technologies.

Design Principles

The following are basic permaculture (ecosystem design) principles:

1) Restraint. Conservation. Do only what is necessary. Seek the maximum benefit for minimum change. "If it ain't broke, don't fix it."

2) Stacking functions. Achieve multiple benefits from every action and design element.

3) Repeating functions. Secure necessary resources (both regulatory and material) in more than one fashion. Design for smooth shifts from one resource to another as circumstances require. Design multiple pathways for every essential flow.

4) Design on appropriate scale. Scale is inappropriate if a screw up will cause a catastrophe. Murphy is everywhere. When mistakes can be regarded as educational and even entertaining, scale is appropriate. However, scale can be so small as to be trivial or insufficient to persist in the face of pressures from the larger context.

5) Focus design activity at edges, interfaces. Energy flows across a gradient. Amplify edges to increase energy flow. Restrict edge to minimize energy transfer. Introduce edge species or other elements to regulate and harness edge transactions.

6) Encourage functional diversity. Functional diversity differs from raw diversity. A great many design elements may contribute instability or may simply fail to function as a dynamic system (be dead). Carefully matched and well-designed elements however, that form many <u>useful</u> connections among them, need not be numerous. It is the number of useful connections among elements that defines functional diversity. A system with highly integrated functional diversity becomes alive and spontaneously develops additional functional connections. It becomes increasingly stable and efficient and begins to look after itself.

7) Reciprocity. Everything works both ways. All gains have costs and many problems present opportunities. Awareness of reciprocity permits design to account for it.

8) The Law of Gifts. Every element in the universe receives input from other elements and transforms that input according to its own nature. In functional systems, the transformation includes delivery of the changed input to the right place at the right time, to benefit other elements in the system. The competent designer must be acutely

aware of the transformational nature of elements--how they affect what they encounter--and the needs of elements--to design patterns where the waste or disturbance created by one element is resource or benefit to others.

These principles apply in all spheres of design: biological, physical, and social (including economic).

Permaculture Economics

Economic arrangements are of vital concern in permaculture. Much of contemporary economic activity is based on the economics of scarcity. In this economic values system, players seek to control resources so that they are unavailable, or scarce, to others who may need or desire them. This resource advantage results in control, to various extents, over those who want the resources that have been made scarce. Such conditions result in scarcity psychology. Insecurity that there will not be enough to go around feeds a desire to control as much valued resource as possible and thus exert economic control over others who wish to use the resource or to have access to it. This drives the scramble to accumulate resources far beyond one's need. Astonishingly, economics of scarcity have led to the ownership of nearly everything on the planet and the assumption that it is natural for people to own everything.

In the economics of scarcity, generally the scarcer something becomes, the more economic value it accrues. Abundant resources have little value. Their usefulness may be ignored, as in the case of kudzu, or
the resource may be wantonly utilized, as is being done with forests. In the case of forests, wholesale destruction for short term gain makes residual forests scarce, therefore of greater economic value. The continued existence of forests is not a concern to investors, who take their profit principally in money that can be invested elsewhere when forests run out.

Money provides as a symbol of economic power and those who can command the most money (by controlling a large share of vital or highly desired resources) reinvest that money to control a still larger share. This cancerous consumption, manipulation, and control of the environmental context in which we live causes most of the environmental crises we confront today.

Capitalism, socialism and communism are but variants of this control game. Bouncing from one system label to another will not address underlying problems of scarcity economics. The economics of scarcity is self-fulfilling.

Permaculture provides a context wherein the economics of abundance can prosper. Fortunately, the economics of abundance can begin to function within existing systems, although legal structures may make this more or less likely in various countries. The economics of abundance rests on the belief that a great deal of resource is available if one is willing to accept what the universe offers in a particular place and time. The economics of abundance also embodies ethical strategies for the genuine scarcity that does exist in certain cases from time to time. Then, our responsibility is to protect scarce resources from any exploitation and to try to nourish their recovery. The scarce resource becomes sacred in a highly specific way, placing limits on its economic uses.

Obviously, in most societies, mixtures of the economic philosophies of scarcity and abundance coexist, often even in the same persons. Where belief in abundance is the main view, abundance tends to manifest. Scarcity economics produce scarcity. Absolute scarcity can exist under either situation. When that happens, human conflict is

unavoidable and we may consume one another until the pressure on the environment is eliminated.

The Kudzu Utilization Project

In the US southeast, kudzu is in abundance. Because it is abundant and because it is difficult to control, it has gained a perception of being of negative economic value. Kudzu costs so many millions of dollars in futile control attempts, engulfed farms and destroyed timber. These are real costs--the abundance of kudzu and the negativity of our response combine to reduce abundance of capital, productive farms, and timber.

But what if we seek to understand the nature of kudzu? It has potential uses and values. It was introduced from Japan, where it is no problem at all. The Japanese and the Chinese from whom they got it, use kudzu at a pace that matches the vine's phenomenal rate of growth.

Clearly, Americans have not used raw kudzu at a rate that compensates for its propensity to grow and spread. Unmodified kudzu can serve as pasture and cut fodder for cattle, sheep, goats and other ruminants. The high protein content of its leaves and the starchy roots suggest a valuable hog pasture. Apparently livestock businesses feel that other approaches to feeding their animals are more profitable.

In the kudzu utilization project, we see animals as an adjunct to value-added processes, absorbing byproducts and converting them into useful materials such as manures, flesh, hides, wool and so forth. One economic potential of kudzu, a raw material for refinement to a high-grade protein extract, is bears investigation. Herbal preparations of reputed medicinal value have established markets and represent another way to tap the abundance of kudzu. Traditional and modern Chinese medicine value ge-gen, a preparation of the root, for a variety of therapeutic uses, some substantiated by research. Kudzu fiber has outstanding properties of great potential utility. And kudzu biomass represents a potential energy source that might be tapped in a number of ways.

What is Kudzu?

Kudzu is a perennial leguminous vine. In a way, it is very much like a giant version of the white Dutch clover that is a common component in lawns and pastures. It sends a central tap root deep into the soil to secure available minerals and moisture at a range of strata. And it spreads its stems across the surface, sending adventitious roots down at leaf nodes to grip the soil along the vine's length. Like many legumes in the pea family, kudzu roots form nitrogen-fixing nodules, fertilizing the soil everywhere it grows. Its adventitious roots also hold soil, making kudzu one of the most effective plants available for controlling soil erosion.

Kudzu also climbs when it encounters vertical obstacles, rather like a pole bean. The vine easily tops the highest trees and has engulfed sidetracked rail cars, empty vacation homes, etc. Kudzu vine soon forms a complete shade, depriving light and therefore life to the plants it has overgrown.

The central kudzu roots can grow 12 feet deep and two or three feet across, weighing hundreds of pounds. Traditional medicine values the root as having powers comparable to ginseng, but at only one half the potency. Ginseng is a frail, small, often endangered woodland species that is difficult to grow and easy to harvest into extinction. Kudzu roots will weigh in at tons per acre and grow almost irrepressibly. A few acres of kudzu probably produces more herbal potency than all the ginseng in entire forests.

Kudzu leaf is fuzzy and superficially unappealing as a vegetable. However ruminants like it. It probably provides similar nutrients to its relative, alfalfa. (Kudzu is rated more valuable than alfalfa in feed rations.) Rabbits, whose livers are nearly identical to human livers in their ability to detoxify plant poisons, thrive for extended periods eating mainly kudzu. Woodchuck dens pock kudzu patches, visible in winter when the vines have died back. Rather than poison its pests, it grows faster than they can eat. The chief limitation to use of kudzu leaf as a vegetable may be its highly fibrous nature and unappealing pubescence. Samples I have eaten (raw) taste fine.

Economic Opportunity with Kudzu

The Kudzu utilization project seeks to generate three classes of income:

• Products such based on food, fiber and herbal preparations that can be developed from kudzu.

• Land rehabilitation. Both the elimination of kudzu and the permaculture development of farms that we operate results in an appreciation of real capital. There also may be opportunity for service income operating as "Kudzu Busters" on land owned by others. (We also get the use of their kudzu for our products.)

• Development of intellectual capital, enabling income from: training; perhaps licensing processes; and possibly from design and manufacture of some equipment.

Leaf Protein Extract

Leaf protein can be extracted through a very simple process similar to making tofu, though with fewer steps. The resultant curd serves many of the same uses as tofu. Leaf protein extraction apparently does not pick up some toxins that may be in some kinds of leaves, although in my view we should verify the safety of plant species on a case by case basis.

The basic process is to pulverize fresh leaves and press the juice from them. When the juice is heated, a cake floats to the top. This is the protein extract. It is skimmed and hung in cheese cloth or pressed in cheese forms to reduce moisture.

Kudzu Curd

No, we probably won't market it by that name. Possibly most equipment for production of kudzu leaf protein extract can be bought off the shelf. (The one exception may be the press for expelling juice from the leaf.) Preliminary inquiries suggest that the kudzu can be harvested by a corn silage harvester/chopper to which simple adjustments have been made. After further shredding or grinding, the juice can be expressed by presses, perhaps the type used in cider production. Process equipment from tofu and cheese manufacturing, packaging techniques from the tofu industry, and ordinary refrigeration should suffice.

We expect initial markets for kudzu curd among vegetarians and health-food consumers. Besides marketing the fresh curd, it is probably possible to develop a powdered extract. "Green drinks" made from leaf juice extracts are widely used by this group of consumers and powdered leaf extract is popular because of its convenience and stability.

Dried kudzu leaf protein curd also may have potential as a livestock feed supplement, and even as a pet food supplement. While these markets are unlikely to command premium prices, the potential sales volume might be greater during initial stages of consumer education.

In the development of a kudzu curd processing plant, there is opportunity to use low-cost appropriate technologies, particularly in the area of energy generation and conservation. We can make inexpensive solar steam generators that provide much of

the process heat. These generators also might run presses for juice extraction and compressors for refrigeration. Energy conservation techniques, such as salvage of heat generated by refrigeration (to dry some product for example) and salvage of heat from spent plant juices (perhaps pre-warming incoming plant juices) will help conserve overall energy use. One use of the solid plant material left over after pressing, badges, might be as back-up fuel to burn for steam production during cloudy periods or at night.

Other Kudzu Products

Three classes of supplemental products need to be evaluated.

• Products based on: efficient use of "by products" of leaf residue (badges) and spent leaf juices (whey); batches of cut kudzu stem and leaf not suitable for making leaf protein; and use of kudzu growing in situations inaccessible to mechanized harvesters. Long-established kudzu patches contain in their biomass a high percentage of woody stems, materials unsuited for leaf curd but of potential value in energy, fiber, and mulch applications. Once mowed a few times to a convenient height such patches should then produce leafy material in abundance.

• Other products that might be made from the kudzu plant instead of leaf curd, perhaps using other plant parts such as roots or flowers. Some of these products, also, may use kudzu growing where mechanical harvest of leaves is impractical.

• Products produced by processes that use workers, capital plant, and/or other available resources during the cool season when kudzu does not grow. This class of products could overlap either of the other two classes above. Such products also might arise from the developed potential of a farm as kudzu wanes due to over-harvesting and other potentials of the place are developed as part of a permaculture design. The ability to produce these products adds directly to earned income and contributes to the capital worth of the farm in question.

It is my intent to investigate many possible products and systems in order to have many choices as we wed our operations to a specific farm. If possible, I will develop to a useful degree information on every option conceived or discovered.

The present conception of the Kudzu Utilization Project is that we will begin with one farm and processing facility and expand, placing processing facilities on additional farms, as market and income justify expansion. Any one farm would use a small portion of potential enterprises, sufficient shift production in response to market forces to the most profitable processes, but few enough for one work force to easily manage them. See the section on permaculture philosophy, particularly the paragraphs on stacking functions, repeating functions and diversity.

Utilization of By Products

Bagasse

• Kudzu fiber is very strong and doubtless suitable for paper making. However quantities required for even a single paper mill would require bagasse from many leaf-curd plants, and so would be only a long term prospect. Extraction of the juice obviously makes the leaf material cheaper to ship. Kudzu fiber also has been used in the Orient to make a fine-quality cloth, comparable to silk.

The Japanese have developed processes for making paper of banana spathe that are probably applicable to kudzu paper. The strong fiber could reinforce paper made from otherwise recycled materials, tapping the new market opened by the recent executive order that US Federal paper purchases contain 40% recycled material.

• Possibly the kudzu bagasse would contain sufficient nutrient to serve as a feed for ruminants. David Kennedy, a leaf-protein expert for Leaf for Life, tells us that

rabbits get as much value from the macerated bagasse after pressing as they do from fresh leaves. (Apparently the maceration makes more nutrient available, compensating for nutrient extracted by the process) Bagasse could definitely serve as a feed for earthworms. They could produce high value worm castings to market as a potting soil amendment or used to restore soils on the farm. Earthworms are low management livestock. The worms themselves are highly valued as fish bait and could be wholesaled for that purpose. In addition, poultry and fish could eat the earthworms. Barrie Oldfield in Australia showed that addition of suitable rock dust to vermicomposting bins increased the amount that worms consumed and converted to castings. Presumably worm production increased also. Moreover, the rock dust would enrich the fertility of the castings.

• The suitability of the leaf residue as a substrate for mushroom production should be investigated. Possibly the residue can be first used as livestock bedding and then used for mushroom production, sterilizing the substrate with the solar-produced steam system mentioned above. This could be one form of off-season activity.

• The leaf residue, when dried, probably could be baled into a building material. Straw bale construction is receiving considerable attention presently, and this would be another raw material for that construction process. Possibly, this could be used to build additional structures at the plant/farm when these are needed. This option needs trials to determine if protein extraction removes sufficient nitrogen to make the bagasse rot-resistant.

• Analysis of residual nitrogen in the bagasse also would determine if it is appropriate to use the it as fuel. If a high percentage of nitrogen remains in the leaf pulp, then its value as fertilizer precludes burning. During combustion, all nitrogen returns to the atmosphere.

• Bagasse would make a suitable mulch for other crops.

Whey

Once the protein cake is skimmed from hot plant juice, a liquid residue or whey remains. Production of commercial quantities of protein would result in a considerable volume of whey. Soluble minerals and carbohydrates, residual protein, and non-protein forms of nitrogen would remain in the whey. Discharged into a natural body of water, this material becomes a pollutant, possibly a serious one. However, the potential nutrient content of the whey suggests value in further food production. Some possibilities, to be examined by trials, include:

• Irrigation of other crops, making use of both water and mineral content.

• Aquaculture production of fishes in which nutrient content of the liquid grows vegetative fish food such as algae and duck weed. (Duck weed volume doubles every three days at 85°F. The whey would enter any holding pond warm, stimulating production.) Tilapia, cat fish, and grass carp are logical candidates for production. Leaf residue also may be suitable feed for herbivorous fish, and may provide a substrate for organisms that convert whey fertility to food nutrients.

• Possibly nutritional algae can grow in the whey, providing an additional "green" product for market to health-oriented consumers. Trials are needed.

• With aquaculture techniques, water plants might grow in whey. Tampala (water spinach) is an example of an aquatic food plant that would likely thrive in this system. There is not a large market for tampala in the United States, particularly in the rural south. However protein could be extracted from the vegetation, increasing the amount of leaf curd our farm produces.

• Aquatic weeds such as water hyacinth and cattails in constructed marshes could purify water leaving the system (either with or without an aquaculture loop). These plants also might be harvested for leaf protein production. Cattail marshes are, alternatively, prime wildlife habitat. The marshes can function as a passive system increasing breeding grounds for birds, fish and mammals, etc. Any constructed ponds, swales, diversion drains and/or wetlands would increase the ground penetration of water on the farm and stabilize regional hydrology.

• Limited amounts of whey may be a valuable material to include in a methane digester, should the farm generate enough other material to run one. Methane would be a valuable cloudy-weather fuel to supplement solar energy in processing leaves into protein

Other Uses of Kudzu

• Cattle and other livestock eat kudzu. First harvests from kudzu fields could contain considerable coarse material formed as the vines grow over other plants. Mature vines are very tough and would contaminate leaf material for pressing. The mixed coarse material can be fed to livestock. Alternatively, it can be chopped for agricultural mulch and used in the recovery of the farm. Once vines are mown close to the ground, young shoots and leaves can be easily harvested for pressing. Nutrient content of dried kudzu leaf compares favorably with alfalfa. Possibly, it could substitute for this expensive forage in processed livestock feeds. (Kudzu grows well in much poorer soil than the finicky alfalfa and requires no cultivation or pest control.)

• As stated, kudzu roots can be processed into an herbal preparation known as *ge-gen* in China. *Ge-gen* has an existing market in natural health and oriental populations. We will investigate the Japanese market, as kudzu root powder is highly valued in that country. Japanese pay top prices for materials that they value. Japanese demand could support development of the US market. Recently, scientific studies involving hamsters indicates that Kudzu root may contain an effective antidote to physiological addiction in alcoholism.

• Kudzu root also has potential as food starch for livestock and people, for ethanol production, and for other applications of starch (e.g., wallpaper paste). However these uses appear unlikely to be as profitable as the herbal preparation. However there may be times to consider these potentials. For example, hogs can root in a field from which larger roots have been removed. As they fatten on the small roots remaining, they ready the land for less rampant plant species, be they agricultural or forest. Or if the market for kudzu herbal preparation appears inelastic, we may choose to avoid flooding the market and produce ethanol for on-farm energy use with surplus root starch.

• Traditional Chinese medicine values virtually every part of the kudzu plant, possibly pointing the way to a line of specialty products. Harvest for these products is largely seasonal, with different products providing gainful activity for different parts of the growing season. One option is to specialize in the processing of such products and to rely on independent plant material gatherers to supply parts such as kudzu flowers. This option avoids labor-intensive bulges in our work flow. It also supports the unique lifestyle of the wild plant gatherers.

• While growing, the kudzu holds soil, increasing its fertility and improving its tilth. The growing conditions created by the kudzu are, in effect, economic gain, realized when we plant suitable crop and forest species once kudzu is suppressed.

Cool Season Products and Enterprises

• The processing plant could produce tofu in the off season using the same equipment as required in leaf curd production. The drawback is that we would be purchasing a crop, soybeans, always associated with serious soil erosion. Tofu manufacture would be a last-resort winter enterprise.

• The press and steam facilities also might produce seasonal food products. Cider could be pressed for shares (half to the apple grower, half for us) in early fall, sorghum in late fall. An evaporator, not needed for leaf protein production, would permit production of cider jelly and sorghum syrup, both high value-added products with indefinite shelf-life.

• Fall and spring, many leaf crops, particularly brassicas and buckwheat, can grow in cool weather. These can provide foliage for making other varieties of leaf curd, adding months to our production season. Seed could be disked into kudzu fields after the last kudzu leaf harvest. Thus, fertility developed by the kudzu would be harvested. This practice could also provide winter cover for the kudzu patch, prevented from producing its own protective mulch by our leaf harvests.

• "Technology transfer," meaning courses and workshops, could take place on the farm during cold weather, teaching permaculture, leaf protein production, etc., using some staff as instructors.

• Facilities maintenance and capital plant development can be scheduled for the cool season. In early years this will include work to develop or test facilities for various enterprises. As the kudzu is played out, winter work can include accelerated implementation of the permaculture design for the place.

Benefits of the Kudzu Utilization Project

Social Benefits

• Jobs for local people in economically depressed regions.

• Potential for employees to buy the farm they work and the concomitant development of kudzu-infested farms into productive, worker-owned farms and farmsteads through permaculture design and implementation.

• Potential to incorporate high-quality, easily produced, virtually free foods into the local diet.

• Possible markets for self-employed harvesters of wild plants, supporting an important lifestyle option, particularly in the Appalachian regions of the kudzu range.

• Creation and demonstration of a profitable model for rehabilitation of abandoned or run-down land to produce products of potential use in the region.

• Economic benefits of the multiplier effect, very high in rural communities, on all economic activity done or stimulated by the project.

• Demonstration of the viability of the economics of abundance.

• Support to nonprofit groups involved in providing leaf curd technology to the "Third World," promotion of solar technologies, permaculture, etc., by channeling consulting work to them in the areas of their expertise at professional rates. Publicity for the technologies these groups promote will also support their work.

• Profit for investors.

• Healthful products for consumers.

Ecological Benefits

• Reverse the spread of kudzu and reclaim forest and farm land.

• Displace products produced at environmental cost with products produced using ecologically constructive methods and strategies.

• Demonstration of the economic viability of alternative energy sources in food harvest and processing setting.

• Demonstration of permaculture design of integrated production processes in a system that produces little waste as pollution.

• Implementation of a permaculture design for each farm, providing all the benefits to ecological stability and diversity, local hydrology, wildlife habitat, etc., that ensue.

Staging

Step 1. Brainstorming. This concept paper is the result. This step continues indefinitely, but at a rapidly declining rate as other steps come on line.

Step 2. Feasibility study. Library research on kudzu and leaf protein extract to generate a body of background information. The beginnings of an extensive data base on kudzu is developed. Engineering aspects of the project are also developed. Farm equipment for harvesting and transporting kudzu is evaluated. Food presses (e.g., cider, wine, sorghum, sugar, etc.) are compared, shredding equipment is studied, etc., to locate appropriate off-the-shelf equipment for the protein extraction process. Likewise tofu and cheese equipment is examined, although this should be more straightforward. Real-estate research is done to determine market prices of kudzu-infested land on flat or moderately contoured land. (Livestock may be the best equipment for harvesting kudzu from steep slopes.) Candidates for herbal remedy products, production based on bagasse and whey, integrated industries (e.g., mushroom production from bagasse) are cataloged and evaluated. Estimated cost: $25,000.

Step 3. Business Plan. Develop a business plan from the information in the feasibility study. Estimated cost: $5,000. Optimally, the business plan will specify a specific site to be purchased, which will permit inclusion of specific integrated product activities from those cataloged in step 2.

Step 4. Obtain investment capital as required in the business plan. Purchase land, develop capital plant.

Step 5. Pilot project. On a moderate scale, a farm with perhaps 200 acres of kudzu, will first test production methods. The product from this pilot project will serve for test marketing. This initial farm should be set up for kudzu product research continuing after the pilot stage. If we know how to make several profitable products from kudzu, we can better adapt to changing market conditions.

Step 6. Expansion based on what we learn in Step 5. As market develops, additional farms are acquired. Each farm receives a permaculture design, implemented to assure its productivity as the kudzu is exhausted from over-harvest. The increase in real-estate value of the farm should be substantial. Employees of that farm could choose to buy the farm through payroll deduction, lease-buy or other such arrangements, placing hardworking people on land whose biological and economic productivity has been restored (as fish farms, cattle operations, poultry farms, flower farms, tree farms, etc.) Employees have incentive to do their jobs well as eventually they can be the people who live on the farm they restore. This entire process, besides being good employee relations and profitable, should net very good publicity that our new food product needs to expand its market.

Step 7. If supported by the market, sufficient kudzu curd operations may come on line to justify use of the fiber in the production of a paper product. Again, publicity should be free and plentiful. Not only will we be saving trees by reversing the spread of kudzu wherever we operate, but we will be using the fiber to replace some paper made

from trees. Again, kudzu fiber can strengthen recycled paper, increasing the volume that our mill can produce with the amount of kudzu fiber we produce. With the federal government now requiring 40% recycled content in its paper, demand for recycled paper will be high. The feds are accepting sawdust as a substitute for recycled paper, of interest because kudzu country is also sawmill country--one can hardly go 10 miles in any direction without passing a small sawmill with a stack of sawdust and a pile of scrap burning. Everything that strengthens local economies where we operate makes us more legitimate and our product less weird.

Step 8. If we develop large and/or fast-growing markets, we will have imitators who would be competitors. At that point we can sell technology and training. Meanwhile we can examine other abundances, such as purple loosestrife in the wetlands of the mid-Atlantic and northeast states, water hyacinth in the subtropical states, etc. Industries can also be developed around sewage treatment, something we would be likely to get into if we get as far as paper manufacture.

Potential Problems

Aside from marketing a green curd as food, the most serious cautions in kudzu leaf protein extraction are sanitation and preservation. The raw material will be harvested directly from the field with no opportunity to cleanse it of bird shit, insects, and possibly parts of vertebrates unfortunate enough to have been too slow to evade the chopper. Extreme care need be taken. Since the product is highly suitable as a medium for microorganisms, rigorous sanitation will be required. Standards need to be developed with practical tests that can be performed in the plant. Product below standards can be used for livestock feed or, in worst case, fertilizer.

Alternate Strategy

Kudzu Utilization & Development Zealots United

The above business strategy was formulated partly in response to potential availability of investment capital. At present, investment funds from that source seem much less likely. "Kudzu Utilization & Development United" (**KUDZU**) is an alternative decentralized approach that can go forward without capital infusion. Kudzu covers a lot of America. Both approaches, the business and the network, can be raving successes and never bump into each other.

The idea of **KUDZU** is simple and easily implemented on a beginning scale. **KUDZU** would be a membership organization for people who wish to share information and ideas regarding the utilization of kudzu. Here at Yankee Permaculture we are set up to put out a newsletter if there are folks who want to first put information into it and second, read it. We have a large work load already--let us know if you like this idea well enough to put some energy in and take a level of responsibility. We can also hold meetings, if someone wants to organize them. Again, we need volunteers to make this strategy real. Let us know who you are.

If you have a farm with a nicely entrenched infestation of kudzu, and you would like to get going on some of the commercial applications mentioned in this paper, we are willing collaborators. Again, we can't take on the primary responsibility but we have a good track record for doing our share.