



PERMACULTURE DESIGN FOR ORPHANS AND VULNERABLE CHILDREN PROGRAMMING

LOW-COST, SUSTAINABLE SOLUTIONS FOR FOOD AND NUTRITION INSECURE COMMUNITIES

TECHNICAL BRIEF

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INTRODUCTION

Among children under five years of age in the developing world, nearly one-quarter are underweight (127 million) and one-third are stunted (195 million). Over 90 percent of those who are stunted live in Africa and Asia (U.N. Children's Fund [UNICEF] 2009, 2011a). These forms of undernutrition can have long-lasting and damaging effects on children, especially when it occurs during critical developmental years.

The situation is even more concerning for orphans and vulnerable children (OVC) living in communities with a high prevalence of HIV; many of these children and their families are food and nutrition insecure as a direct consequence of the epidemic. Severe and moderate acute malnutrition (wasting) among people living with HIV, including children and youth, occurs where HIV prevalence is high, and there are delays in seeking treatment. And among infants living with HIV, low birth weight (a major determinant of mortality and morbidity) is not uncommon (Regional Centre for Quality of Health Care 2008).

A recent AIDSTAR-One review of promising practices in food and nutrition security programming for OVC revealed very few models of sustainable programming that directly impact long-term food and nutrition security for OVC and the families who care for them. Programs attempting to address these challenges are mostly small-scale, short-term, donor-reliant, and/or expensive in terms of inputs per child.

For most countries attempting to meet food and nutrition security challenges at scale, school meals have been the intervention of choice because of the positive impact on school attendance, cognition, and educational achievement, particularly when supported by complementary actions such as deworming and micronutrient fortification or supplementation (Bundy et al. 2009). School feeding programs, unfortunately, often

rely heavily on resources external to communities and even to the countries themselves. Additionally, these inputs may not be available beyond a given donor's project cycle. While school meals can deliver important short-term value, especially in terms of OVC retention, they do not address long-term food and nutrition insecurity in a sustainable manner.

One development approach that shows promise for OVC programming, particularly in an HIV context, is permaculture. Permaculture is a framework that works toward sustainability of human habitats. It maximizes the use of local resources, applying ecological principles to meet human needs for food, shelter, energy, and a sense of community. In the context of OVC programming, permaculture helps guide communities toward permanent solutions for food and nutrition security while ensuring that these options exist harmoniously within their environment. Importantly, bringing a perpetual source of food and nutrition to OVC through households, schools, and other community institutions is only one aspect of what permaculture offers to OVC programming. It also offers opportunities for income generation, and on a more philosophical level, it teaches children about their relationship with the environment and how to meet their needs in a responsible, environmentally-friendly manner.

The purpose of this technical brief is to provide an overview of permaculture programming as a response to food and nutrition insecurity for OVC. It emphasizes the role of permaculture as a sustainable, non-donor dependent tool for improving the health, food and nutrition security, and livelihoods of OVC and their families.

Specifically, this brief aims to:

- Define permaculture as a development approach and design process, and describe some of its key concepts and principles

- Explain why permaculture is relevant to OVC programming, particularly in the context of HIV, and list some of its benefits
- Explain the theory and step-by-step practice of applying permaculture design in primary and secondary schools
- Delineate the costs of integrating permaculture into school curricula, and into communities more generally
- Identify the implementation challenges and make recommendations on how to overcome those challenges
- Provide brief summaries on the use of permaculture in schools in South Africa and Malawi
- Offer a list of resources and networking opportunities to OVC programmers interested in applying permaculture within their specific country contexts.

This technical brief is not intended to offer an exhaustive review of permaculture’s methodology. Instead, it serves as an introduction to its principles, and provides initial guidance and examples on how it can be used to benefit OVC and their families. The geographic focus of this brief are countries in Africa with high HIV-prevalence.

WHAT IS PERMACULTURE?

The term *permaculture* was coined in the 1970s by two Australian ecologists, Bill Mollison and David Holmgren, who believed that the best ideas come from nature. Mollison and Holmgren aimed to design a system that mimicked natural systems, while simultaneously providing for the wide spectrum of human needs. The word permaculture is derived from the

“Permaculture is the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems.”

–Bill Mollison

words “permanent agriculture.” It emphasizes sustainable and regenerative agriculture practices.

What sets permaculture apart from other developmental approaches is that it is not just a model, it is a comprehensive design process. Each site, whether a household, school, clinic, business, farm, or village, has a unique set of elements and design considerations. But while each site is viewed as unique, permaculture is always based on three foundational ethics (Mollison 1991):

1. Earth care—care for the earth and all of its living systems
2. People care—care for yourself and others (individuals, families, and communities)
3. Fair share—be fair: take, have, and use only what you need, and when there is surplus, give to others and recycle resources back into the system.

As suggested by these core ethics, permaculture seeks to sustain both people and nature. Its purpose is to create living environments that meet people’s basic needs for nutritious food, dwellings adapted to climate, community or household sanitation, and access to health services. While people’s well-being is primary, the conservation of natural resources—through planning, careful selection, use, reuse, and recycling—is also crucial.

As the benefits of permaculture are recognized, many practitioners are beginning to refer to it as *permanent culture*, acknowledging permaculture as a global movement that can help sustain the world's diverse cultures.

Though many permaculture concepts and activities have existed for centuries, permaculture as a holistic framework of design is still relatively new in many developing countries. In several African countries, permaculture is experiencing a surge in popularity. There are now permaculture centers and institutes in Botswana, Cameroon, Ethiopia, Ghana, Malawi, Mozambique, South Africa, and Zimbabwe. (Permaculture resources are listed at the end of this brief.)

WHY IS PERMACULTURE RELEVANT TO ORPHANS AND VULNERABLE CHILDREN IN THE CONTEXT OF HIV?

The impact of the HIV pandemic on children and youth is well documented. According to the Joint U.N. Programme on HIV/AIDS (2010), 16.6 million children aged 0 to 17 years have lost parents due to HIV. Moreover, one-third of all new HIV cases are youth aged 15 to 24, according to UNICEF's *State of the World's Children 2011* (UNICEF 2011b).

Growing up living with—and affected by—HIV presents a wide range of challenges for children and youth. Families affected by HIV often have fewer adults who are able to harvest crops, earn income, and contribute to the well-being of the children, including providing a nutritious diet. When children are orphaned, or their parents are ill, they grow up unsupervised and are forced to take on adult responsibilities, such as caring for younger siblings and ill family members and finding enough food to survive. Permaculture is particularly

relevant when dealing with these challenges for a variety of reasons, as follows.

Intergenerational knowledge gap: When parents die prematurely, knowledge and skills relating to agriculture, food, health, and culture are often not transferred to children. Bringing permaculture into school curricula helps recover this knowledge base among in-school children. (See Box 1. Permaculture Introduced into School Curricula in Malawi). It supports the delivery of important lessons on taking responsibility for one's actions and acting ethically toward other people and the environment. Permaculture lessons emphasize links between growing food; dietary diversity; nutrition; water, sanitation, and hygiene (WASH); and healthy (or “positive”) living. Finally, the hands-on nature of permaculture lessons lend itself to be taught to children, youth, and adults of all levels of literacy.

Shortage of productive resources: OVC and their families are frequently forced to employ a range of risky responses, such as selling off productive assets and taking children out of school to earn an income, in order to cope with the cumulative costs of living with illness (e.g., medical bills, funeral costs, transport to the hospital, and child care).

Permaculture encourages mobilization and improved use of traditional, neglected, and underutilized resources. Emphasis is on expanded use of indigenous crops and wild plants for greater dietary diversity and medicinal uses. For example, “more than 1,500 species of wild plants in Central and West Africa can be eaten” (Barany et al. 2001). And, for the most part, these underutilized plants are accessible, affordable (or free), easy to prepare, and well adapted to local growing conditions. (See Box 2. Growing Papaya.)

Permaculture design is done with energy conservation in mind. Zoning ensures that high-maintenance features are placed close to community buildings (e.g.,

houses, schools, churches, health centers, or community centers), while low-maintenance features are in outer zones (see the following section “From Theory to Practice”). Permaculture does require some physical labor to rejuvenate the land and establish preliminary design features, such as water-harvesting, composting, mulching, soil preparation, and out-planting. But after the initial labor investment, time and labor decrease dramatically and food production increases as systems become fully functional. In many cases, benefits are reaped (e.g., production of herbs, legumes, vegetables, and some fruits) within the first 3 to 6 months.

Malnutrition: As noted previously, undernutrition among OVC remains a significant problem throughout the developing world. Permaculture teaches that dietary diversity is key to improving nutrition, and use school gardens, orchards, greenhouses, kitchens, and classrooms as learning laboratories for studying the sources of nutritious meals. Permaculture emphasizes the importance of growing and consuming locally available nutrient-rich foods to address protein and micronutrient deficiencies and to build a healthy immune function, minimizing the effects of HIV.

For people living with HIV who are on antiretroviral therapy, a balanced, nutritious diet is particularly important to mitigate side effects and optimize treatment outcomes. While food by prescription programming, as an adjunct to antiretroviral therapy, has experienced a surge in popularity in recent years, these programs rely heavily on donor funding to purchase manufactured food commodities, such as Plumpy'nut and other ready-to-use therapeutic foods. Permaculture programming could potentially mitigate the need for food by prescription programming over time, as families affected by HIV would have better access to nutritious meals from food they have grown or collected themselves.

BOX 1. PERMACULTURE INTRODUCED INTO SCHOOL CURRICULA IN MALAWI

Permaculture was formally introduced into the national school curricula in Malawi in 2006 by the Ministry of Education, Science and Technology as part of its School Health and Nutrition program.

After almost a year of being designed, the program was piloted in 2007 and 2008 in 40 primary schools, 11 teacher development centers, and a teacher training center in 8 of Malawi's 34 education districts. Over 150 permaculture facilitators were trained, including teachers, members of school management committees, and agricultural extension workers. Linkages were made with the Ministry of Health and tertiary institutions that train and create education, health, and agriculture curricula.

To be sustainable, there is an emphasis on low-input strategies that implementers can replicate using their own resources, without the need for outside funding. These strategies are explained in a manual developed with support from the U.N. World Food Programme, the *Low Input Food and Nutrition Manual—Growing and Eating More Using Less*. Topics covered in the manual include water harvesting, refuse management, landscaping and design, labor-saving interventions, and meal planning.

Achievements of Malawi's permaculture curricula include the following:

- Almost all schools have reduced their labor requirements and increased productivity by changing destructive habits of oversweeping and burning organic matter. At the same time,



Thyolo, Nka Primary School, before permaculture and one and a half years after the permaculture pilot. (Photos provided by GIZ Malawi and Chris Walker)

productive habits have increased, such as mulching and caring for plants, trees, and animals.

- In the first year and a half, each school planted approximately 2,500 trees (three per learner) and many other plants. Trees included those that bear fruits, nuts, and vegetables, as well as those used for medicinal purposes. Species were locally sourced and included all the necessary food groups,¹ fuel sources, and building supplies. The species are all self-seeding and provide the schools with increased seed resources, which are multiplied and shared every year.
- The teaching and learning environments of the schools have dramatically improved. The surroundings are cooler; and there is less dust and mud, less

¹ In Malawi, the Ministry of Agriculture and Food Security (Food and Nutrition Unit) promotes six food groups. They are vegetables, fruits, legumes and nuts, animal foods, staples, and fats and oils. All are considered necessary for a healthy diet, except for animal foods.

erosion, and more water returning into the ground water table.

- All pilot schools harvested some food, with many experiencing significant harvests, not only of food, but of fuel wood for stoves from trimmed branches, seeds for planting, and medicinal plants.
- Just as the plant and tree species are open pollinated and self-spreading, so are the ideas. Schools, homes, hospitals, and other institutions surrounding the pilot schools are copying the school's permaculture activities.

The pilot will be evaluated in the coming months to gauge which elements have been most sustainable after two years, what has gone well, and what can be improved. The Ministry of Education, Science and Technology will decide on the future direction of the program based on the evaluation results.



Thunga Teacher Development Center and Secondary School before and one year and three months after the permaculture pilot. (Photos provided by GIZ Malawi and Chris Walker)

BOX 2. GROWING PAPAYA—A PERMACULTURE INTERVENTION

In many countries, vitamin A deficiencies in children have become an urgent and chronic dilemma. Vitamin A is essential for healthy immune function, and inadequate levels can lead to irreversible blindness. A child who is deficient of vitamin A also has a 25 percent greater risk of dying from common ailments such as measles, malaria, or diarrhea (UNICEF 2001).

Current public health responses to vitamin A and other micronutrient deficiencies include mass food fortification and the dissemination of nutrition supplements. In Malawi, for example, the government distributes vitamin A capsules through health centers and works with local food processors to fortify cooking oil. Because deficiencies continue to be a problem, the government recently initiated a program to fortify the country's sugar supply with vitamin A. Irish Aid, the Irish government aid agency, has since committed 4 million euro to assist with roll-out and implementation.

A permaculture approach to this dilemma begins by looking at local sources of vitamin A and then incorporating these sources into an integrated design. While there are hundreds of natural vegetable and fruit sources of vitamin A, one that is prevalent in many developing countries is papaya. This fast-growing plant often yields fruit within one to two growing seasons. Its texture makes it an ideal weaning food for children 7 months to 3 years of age, which is a common target group for supplementation.

Unlike expensive supplementation and fortification programs that typically rely on foreign assistance, local resources such as papaya seeds can be sourced without start-up costs. One papaya fruit can yield hundreds of viable seeds that may be replanted and shared with other community members. After one year, a well-designed community or school program that has integrated papaya trees and other local fruits and vegetables into its permaculture design will be well on its way to tackling vitamin A deficiencies with no need for an externally funded intervention.

This type of sustainable solution has additional benefits. Papaya seeds have been used successfully in the eradication of intestinal parasites (Okeniyi et al. 2007). The fruit contains over 100 percent of the recommended daily value of vitamin C and is a significant source of fiber, folate, and potassium. The unripe fruit can be cooked as a vegetable. The tree also produces a latex, known as papain, that is used as a meat tenderizer and for producing a variety of industrial and pharmaceutical products. A permaculture approach such as this can be applied to other nutritional deficiencies, addressing the core problem while simultaneously creating economic opportunities and restoring health to surrounding ecosystems.

For more on the nutritional content of papaya, see: <http://nutritiondata.self.com/facts/fruits-and-fruit-juices/1985/2>.

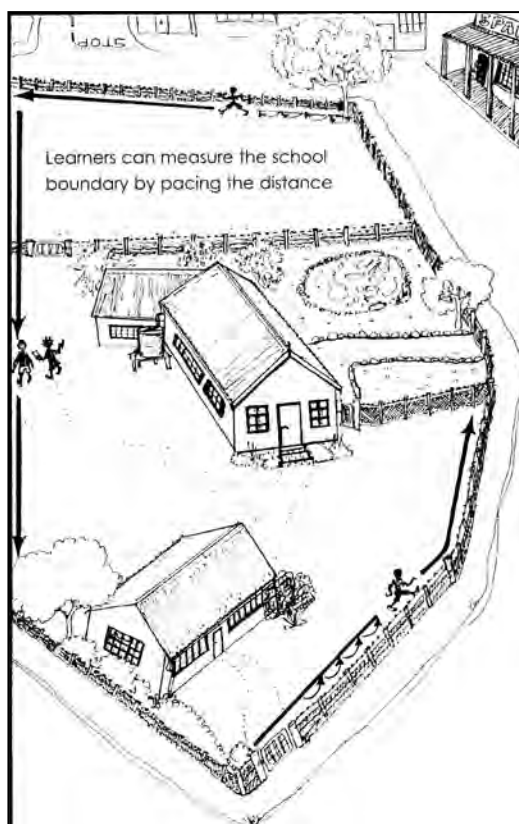
FROM THEORY TO PRACTICE— APPLYING THE PERMACULTURE DESIGN PROCESS IN SCHOOLS

Adopting permaculture in schools can turn the school grounds into “living classrooms.” The design process described subsequently is used by permaculturalists throughout the world.²

Step 1: Observe, explore, and gather information

Students conduct a resource and needs analysis through discussions with a wide variety of people and hands-on observations.

Figure 1. Base map (Source: SEED 2004)



² Adapted from the manual *Designing for Abundance: Permaculture Mapping and Design*, developed by the Schools Environmental Education and Development (SEED) project in South Africa for grades 4 to 6 (www.seed.org.za/downloads.php). The designs and photos come from Alpine Primary School, near Cape Town, South Africa.

Step 2. Draft base map and sector analyses

- Students draft a base map of what already exists, then redraw it neatly with a scale (see Figures 1 and 2).
- Students draft a sector map (see Figure 3) to illustrate outside influences (e.g., summer and winter sun angles, wind directions, shade patterns, odors, fire threats).

Figure 2. Base map to scale (Source: SEED 2010)

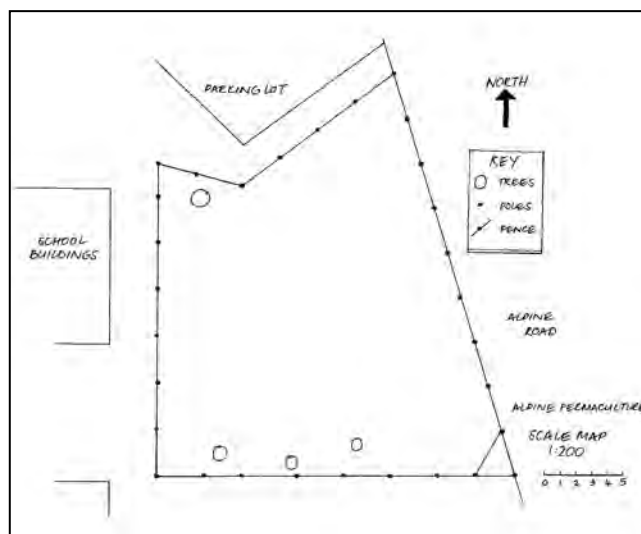
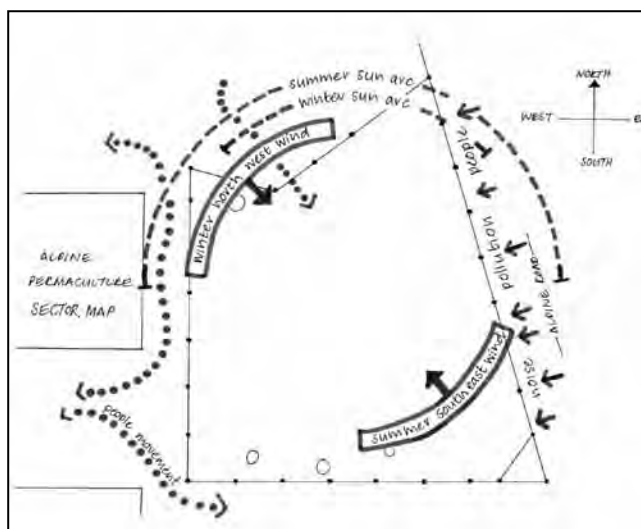


Figure 3. Sector map (Source: SEED 2010)



Step 3. Select elements

Students make a list of all resources (elements). First, they list resources that already exist on-site; these should be illustrated on the base map. Next, students list the elements they would like to include in the future, such as plants, trees, animals, insects, structures, play areas, etc. The desired elements are combined with the base map's existing elements to create the design.

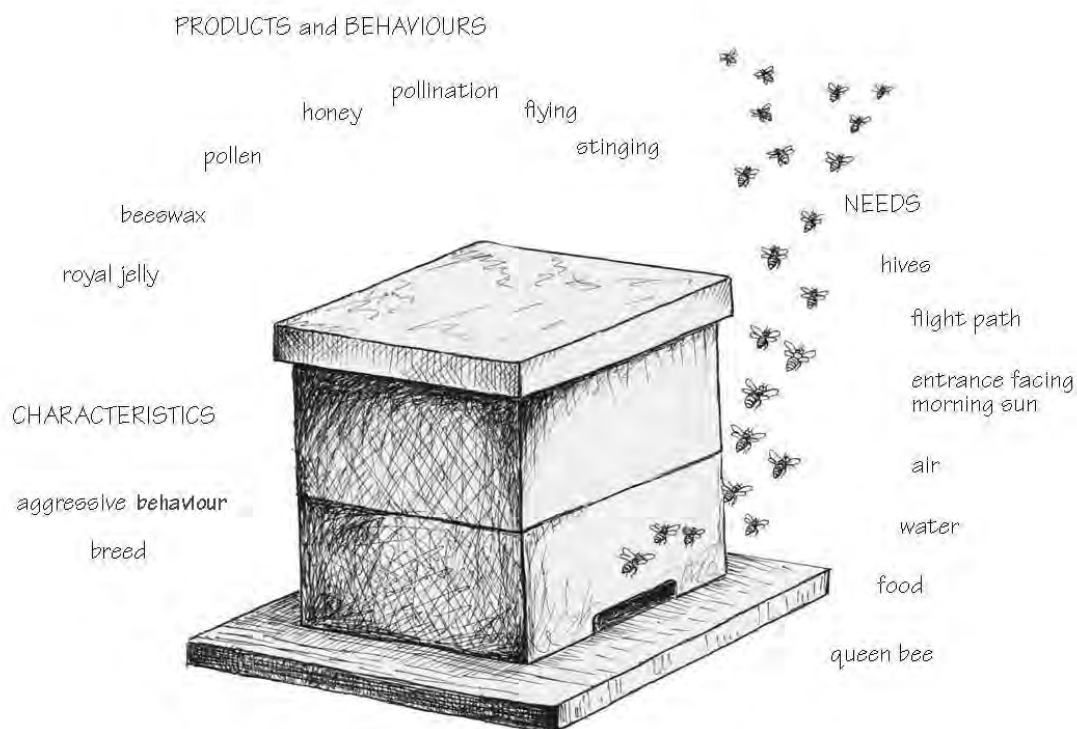
Step 4. Conduct input/output analysis

Students examine each element based on its products (outputs), needs (inputs), and characteristics. Figure 4, for example, explains the products, needs, and characteristics of bees.

Step 5. Zoning

To help conserve energy, students identify the various zones on their designs, numbering them from 0 to 5 (see Figures 5 and 6).

Figure 4. Products and behaviors of bees (Source: SEED 2010)



Example of an element (bee and hive) with inputs (needs), outputs (products) and characteristics.

Figure 5. Zone map example (Source: SEED 2010)

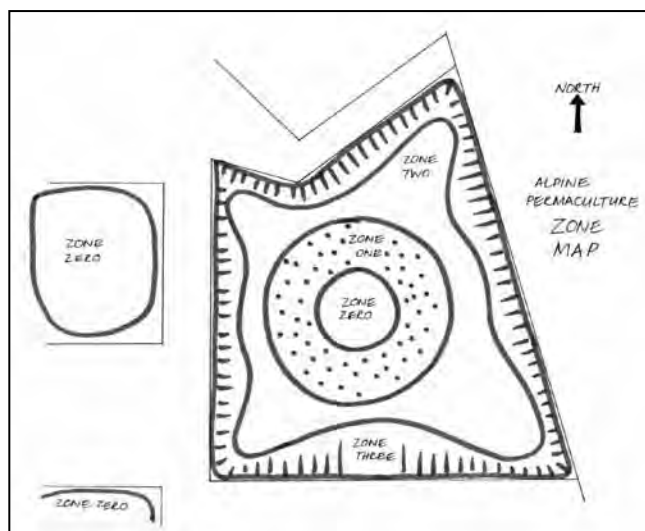
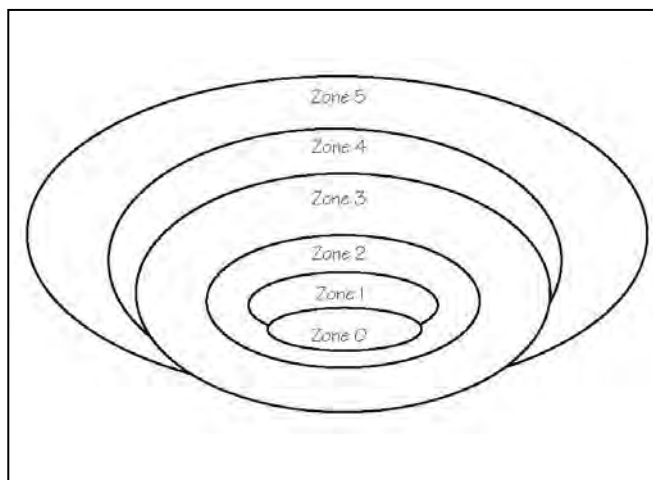


Figure 6. Zones are based on the amount of maintenance an element needs; they are not necessarily circular (Source: SEED 2010)



ZONE 0	Infrastructure	<p>The home, school, or clinic.</p> <p><i>Elements include indoor compost toilets, internal water harvesting structures, natural air flow, lighting, recycling, furniture, fuel-efficient food preparation, etc.</i></p>
ZONE 1	Intense Production	<p>This area needs the most care, but brings the greatest rewards.</p> <p><i>Elements include kitchen gardens for food and medicine, nurseries, water sources, composts, worm farms, shade for zone 0, water harvesting features to recycle from zone 0, etc.</i></p>
ZONE 2	Integrated Orchards	<p>This area contains perennials and lower maintenance species and is located where it is convenient for occasional care and use.</p> <p><i>Elements include fruit and nut trees, lower maintenance plants, and animals, ponds, bees, etc.</i></p>
ZONE 3	Rain-fed Agriculture	<p>Diverse cropping systems maintained by natural weather patterns or assisted by sustainable irrigation systems.</p> <p><i>Elements include field crops, agroforestry, grazing for small herds of animals, windbreaks for the gardens, etc.</i></p>
ZONE 4	Managed Forest Systems or Woodlots	<p>Perennial systems maintained by natural weather patterns and designed for a specific purpose.</p> <p><i>Elements include fuel wood; building materials; fruit, nut, and oil trees; pastures for larger herds; areas where wild or indigenous foods and medicines are collected; etc.</i></p>
ZONE 5	Natural Wilderness	<p>The natural classroom. This zone is taken care of solely through natural processes.</p> <p><i>Elements include natural forests, lakes, grasslands, mountains, etc.</i></p>

Source: SEED 2010

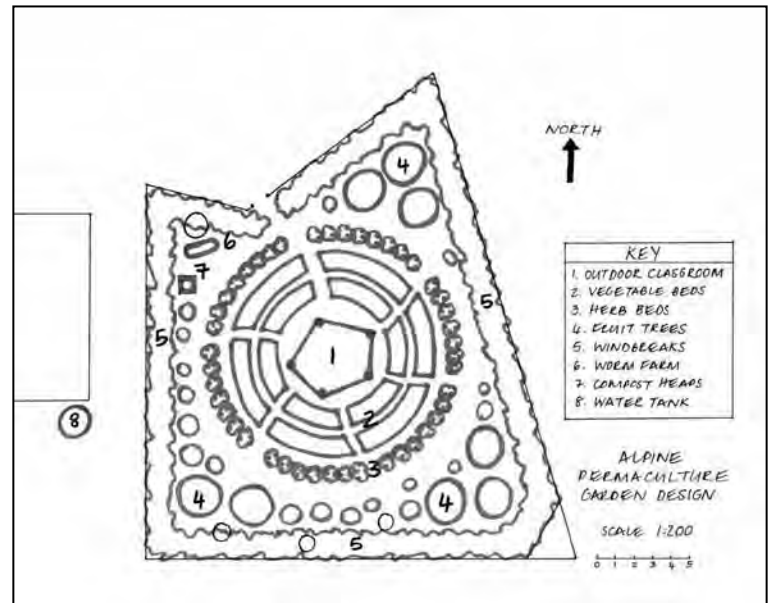
Step 6. Draw the elements in the design

Finally, students draw a design based on all the previous considerations, including elements (existing and future resources), sector influences, and zones (see Figure 7). Designs should also take into account good water management techniques, soil health, incorporation of diverse plants and animals, as well as the sustainable provision of human needs (i.e., food, energy, fuel, etc.). This design is generally drawn on paper but can also be represented on the actual site using stones, sticks, broken bricks, or other locally available resources (see photos).

Drawing the design on the area to be planted (top), and planting and mulching the design area (bottom). (Photos from SEED 2010)



Figure 7. Zone map for Alpine Primary School (Source: SEED 2010)



PERMACULTURE PRINCIPLES

In addition to the three ethics described previously, permaculture design also relies on a set of principles. Some of the key principles are listed as follows.

Work with nature, not against it. This is the underlying principle of permaculture philosophy. It teaches young people (and adults) to spend a significant amount of time observing, analyzing, and planning before even beginning to make changes to the landscape and infrastructure. Permaculture looks at elements (plants, animals, and infrastructure) in terms of their characteristics, their functions (i.e., their needs and what they produce), and their relationships with other elements in the system. This principle accepts nature as the teacher and emphasizes the importance of slowing down so that students can learn from nature.

Use natural materials, produce no waste, and take advantage of cyclic opportunity. Nothing is

considered waste in the world of permaculture. In a conventional garden where trimmings, branches, and other excess plant material are hauled away, all of the nutrients and energy in those materials are removed from the system. The eventual result is barren soil that cannot support plant growth without chemical fertilizers, the latter of which can be harmful to people and the environment, not to mention unaffordable to many OVC families. In contrast, when energy and nutrients are cycled locally, the result is a resilient, self-sustaining natural web. In schools, plants produce food for humans, and food scraps and other excess plant materials go to the compost bin (or to feed chickens). In many schools, composting toilets are used so that even the energy of human waste is captured and turned into fertilizer (see Praetorius 2009).

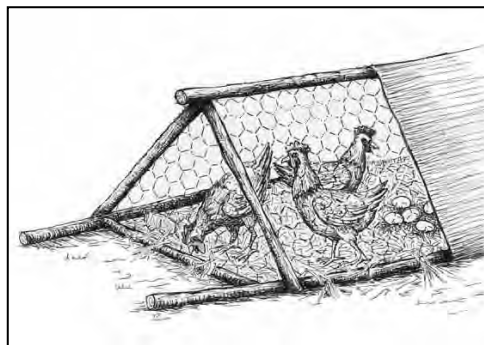
Make use of diversity. The roots of permaculture lie in nurturing diverse ecosystems. At the household level, diversification is not only the best way to ensure nutrition security (through dietary diversity), but it also helps to ensure year-round food security, because the food supply is constantly replenished as different foods are harvested at different times of the year. This is in stark contrast to monocropping, where there are one or two massive harvests per year, providing a great deal of food in a single season, but not necessarily ensuring a healthy diet.

Encourage multifunctionality. Plants, animals, and other elements are arranged in “guilds,” with each guild ideally performing up to seven functions. A well-designed guild should provide food for people, food for the soil, groundcover, diggers that keep the soil porous and bring up minerals, climbers and supporters that stack food vertically, and protectors that keep the whole system free from harm.

Chickens, for example, perform a vast number of functions. They provide eggs, meat, and feathers; they peck and scratch the soil to clean garden beds; they

eat insects and weed seeds; their manure makes excellent fertilizer; and finally, chickens can enhance learner commitment to the garden as children spend hours watching them, naming them, and feeding them kitchen scraps they bring from home (SEED 2010).

See solutions not problems. There is a saying in permaculture: “There is no such thing as a weed; it is simply a good plant in the wrong place.” Damaging insects and intrusive plants can be put to good use if one is able to discover their specific functions. Even mosquitoes play an important role in pollination. Certain plants and insects can be used to attract beneficial predators that will keep unwanted populations in check, while other plants and insects can be used to repel these same unwanted elements.



A chicken tractor is a bottomless, portable shelter-pen that can be designed in many shapes and sizes. The chickens peck and scratch to eat insects and seeds and their manure and feathers add fertility to the soil. The tractor is moved to different areas where soil health needs improvement. (Drawing from SEED 2010, photo from Afristar website)

WHAT DOES PERMACULTURE COST?

The cost associated with implementing permaculture in schools, or within any OVC platform, depends on a variety of factors. The design process always begins by assessing preexisting and locally available resources and then developing design ideas based on these observations. In situations where communities can be empowered to come together to provide local resources (i.e., tools, seeds/seedlings, labor, etc.), implementation can be completely free, and in the long run can even generate significant revenue. Where commitment is less than ideal, a budget for garden tools, seedlings, and other supplies may be necessary. In some cases, existing tools can be adapted for new uses.

The primary costs associated with any permaculture intervention generally relate to training and design process sensitization. The internationally recognized standard for earning a Permaculture Design Certificate is based on the completion of a 72-hour, component-based course that is taught by a certified trainer. Courses are often conducted over 12 days, with food, lodging, and travel reimbursements provided for participants. If inexpensive accommodation is sourced, a complete 12-day course can be delivered for approximately U.S.\$35/participant/day. This translates to roughly \$10,500 for 25 participants. Benefits of this intensive training include participant receipt of an internationally recognized certificate, and they have the potential to become future trainers after two years of applied experience.

Introductory courses and community sensitization sessions can be conducted in any context and integrated into extension services within ministries of health, agriculture, or education. Courses are not heavily technical, as implementation of permaculture does not rely on specific botanical knowledge. In-

stead, lessons focus on the functions of plants and other elements; for instance, identifying plants in a particular region that can act as groundcover, climbers, nitrogen fixers, etc. Often, this relies more on existing local knowledge than outside expertise.

A five-day “Introduction to Permaculture” course can generally be delivered to 10 people at a cost of approximately U.S.\$100 (\$10 per participant), assuming participants can sleep in their own homes and allowances are not paid. These 10 individuals would then be equipped to serve as a community-based support team for a school or community that intends to undertake a permaculture project. They would have enough knowledge to kick-start the implementation process for a school or community, with ongoing visits by a permaculture trainer to sustain the implementation process.

With regard to the cost of actual design features, permaculture can be as sophisticated or as simple as one chooses to make it. Water harvesting, for example, could be done for free by selecting hand-dug pits. Alternatively, it could cost thousands of dollars using high-tech storage containers. This applies as well to technologies that make use of solar, wind, thermal, and other sources of energy. After locally available solutions have been exhausted, the incorporation of additional technologies should be evaluated in terms of how important they are to the design system, as well as whether they are practical, sustainable, and of course taking cost into consideration. (See Box 3. SEED Integrates Permaculture into Cape Town Primary Schools.)

IMPLEMENTATION CHALLENGES AND RECOMMENDATIONS

Expectation of inputs: Implementing permaculture is very different from school feeding or typical agri-

BOX 3. SEED INTEGRATES PERMACULTURE INTO CAPE TOWN PRIMARY SCHOOLS



Students planting a wind-break (Zone 3).

The Schools Environmental Education and Development (SEED) Project, founded in 1998, is a South African non-profit that partners with under-resourced schools to transform learning environments through permaculture. SEED's Organic Classroom Program lasts for three years, at which point a sustainable permaculture system is in place that contributes to food security and serves as an educational tool for students and teachers.

SEED facilitators mentor teachers on a weekly basis so that the teachers can plan and deliver education in the garden. The facilitators also build the capacity of teachers and students to sustain the program after the three year period. SEED's lessons are based on both the needs of the garden and the local Department of Education's compulsory work schedule for teachers.

Every year focuses on different topics, with each year building upon the previous year, as follows:

- Year 1 (Green Beginnings) starts with a consultative permaculture design process. Implementation includes the outdoor classroom, indigenous shelter belts, food forests, rain-harvesting systems, mulch and compost systems, vegetable gardens, and herb barriers.
- Year 2 (Green Practice) focuses on making the food garden an integral part of the school year through planting calendars, crop rotation, and building fertility. Plans are made with kitchen staff for planting and harvesting and holding garden feasts.
- Year 3 (Green Abundance) is when the abundance of the garden becomes evident. Students are involved in economic management sciences projects and make value-added products from the garden (e.g., remedies, creams, teas, fertility products).

Students of all ages get involved. Grade three students, for example, are introduced to the “web of life,” during which they walk through the garden and touch, smell, and observe flowers, spiders, insects, and lizards. In grade four, children build worm farms, dig holes, plant, and learn to propagate plants.

More information on SEED can be found at: www.seed.org.za.



The start of an outdoor classroom.



Base-mapping the garden site. (Photos from SEED 2010 and SEED website)

cultural and WASH programs in that few (if any) inputs are provided to program participants. This may be disappointing to teachers, parents, or ministry of education staff who are accustomed to receiving food assistance, seeds, tools, or monetary allowances for attending training.

Establishing clear expectations and community ownership is crucial if programs are to be effective. Often, this begins by first sensitizing those involved at schools as to the “whys” of permaculture so that they understand the benefits that can be obtained from a healthy environmental and diverse diet. The “hows” are only presented after the concept is understood.

Next, implementation should be a fun and exciting learning process for all involved. Incentives can be used as long as they are not viewed as handouts. Programmers can organize contests, for example, or reward systems that allow schools to win or earn garden tools, seedlings, or other supplies. It must be communicated, however, that incentives are not essential to getting started. Most start-up inputs should come from community donations (e.g., time, knowledge, labor, seedlings, tools) or from the children themselves (e.g., bringing seeds and hoes from home).

Land tenure: It is true that secure access to land often allows for more freedom to experiment and encourages the land owner to make longer-term investments. Land ownership, however, is not a prerequisite for implementing permaculture. Public spaces can offer exceptional opportunities for communities to put permaculture ideas into practice. In school permaculture programs, for example, there is often no one individual who owns the land, but rather it is community property and a place of learning. Experimentation therefore benefits the community as a whole.

Excessive focus on single staple crops: Modern agriculture has brought with it a tendency toward monocropping, which translates into a heavily cereal-centric diet in many places (e.g., corn in southern Africa). Even when harvests are adequate—which they often are not—this trend can promote under-nutrition in the form of protein, fat, and micronutrient deficiencies. Despite the risks of a cereal-centric diet, shifting mindsets toward growing a diversity of crops remains a challenge.

Permaculture teaches that obtaining massive yields from single-crop systems is not the same as food security. In Malawi, for example, the last four growing seasons (2006 to 2010) produced enough corn to meet the country’s staple food demands, plus nearly 1 million metric tons of surplus each year. Despite this excess crop, stunting and micronutrient deficiency rates have remained constant.

Overcoming a single-crop focus requires incorporation of nutrition education on several levels. The links between cereal-centric diets and health problems must be demonstrated and understood. Populations need continued exposure to beneficial examples and demonstration plots. Success stories of agricultural diversification need to be shared. (Some links to educational and teaching materials are found at the end of this brief.)

Myths, stigma, and obstructive cultural beliefs:

There are strong cultural norms and beliefs that create barriers to successful implementation of permaculture activities.

For example, the practice of sweeping the ground around houses and schools until the earth becomes compacted and void of vegetation is based on the belief that sweeping promotes cleanliness, order, and good hygiene. In actuality, the contrary may be true. Oversweeping can actually cause poor hygiene

conditions, because water runoff can carry fecal matter into water sources, leading to cholera and other dysentery diseases. Additionally, excess dust in the air caused by sweeping can lead to chronic respiratory problems.

In contrast, permaculture advocates for using all areas to their fullest potential to provide for human needs. A permaculture approach would encourage planting of useable crops around the homestead and schools. Minimal sweeping can still be done to maintain pathways, but the debris would then be added to the garden beds to improve soil fertility and enhance soil structure, while simultaneously providing functional and nutritious landscapes.

Another stigmatizing belief is that indigenous foods are only eaten by poor people. In every country, there are commonly hundreds of highly nutritious and well-adapted local plant and animal resources that are ignored and neglected as they are considered foods of last resort. Without addressing this form of stigma, communities will continue to prefer diets that are cereal-centric and emphasize foreign-introduced crops, such as cabbage, onions, tomatoes, carrots, oranges, and apples, many of which can be expensive and difficult to grow.

Making better use of stigmatized foods requires integrating traditional resources into modern systems. Food security assessments should include a review of access to traditional foods; agriculture projections should include yields from all of the food groups; and financial incentives could be given for locally produced products. Nutrition education, including meal and recipe planning, should include the benefits derived from local foods.³ Overcoming these beliefs, and in some cases overcoming fears that these

³ While nutrition researchers have made advances in the exploration of local foods, documentation remains a challenge because many have not been tested in laboratories for nutrient content or recorded in food databases by the Food and Agriculture Organization or academic institutions.

changes are too risky, is an ongoing challenge to implementation.

RESOURCES

Permaculture Centers and Institutes:

Fambidzanai Permaculture Center, Zimbabwe:
www.fambidzanai.org.zw/

Nature's Gift Permaculture Training Center, Malawi:
www.naturesgiftpermaculture.org

Plan Africa, South Africa: www.planafrika.net/

The Permaculture Research Institute of Australia:
<http://permaculture.org.au/>

Educational and Teaching Materials:

Tagari Publications (Australia) founded in 1978, is one of the original groups dedicated to supplying permaculture resources (including Bill Mollison's *Permaculture One*, *Two*, and *Designer's Manual*), training supplies, etc.: www.tagari.com/

SEED (a South African nonprofit) provides a wide variety of permaculture teaching materials, including *The Organic Classroom* for grades 1 to 3. SEED also trains schools in implementation of permaculture programs: www.seed.org.za/downloads.php

The Center for Ecoliteracy (United States) is a public foundation dedicated to education for sustainable living and has various ideas for school initiatives: www.ecoliteracy.org/

Permaculture Magazine (United Kingdom) includes articles on cutting-edge sustainability ideas from around the world: www.permaculture.co.uk/

Permaculture Activist Magazine (United States) has been offering ideas and resources on permaculture for the past 26 years:
www.permacultureactivist.net/index.html

Green Teacher (Canada) is a magazine that helps youth educators enhance environmental and global education inside and outside of schools:
www.greenteacher.com/

Low Input Food and Nutrition Manual...Growing and Eating More Using Less is a manual developed and tested with support from the U.N. World Food Programme:
www.neverendingfood.org/h-low-input-manual/

Permaculture Projects in Africa:

The Regional Schools and Colleges Permaculture Programme (ReSCOPE) uses permaculture to transform schools and colleges throughout southern African into productive centers of agroecological resources for their communities. ReSCOPE has alliances in Kenya, Malawi, South Africa, Uganda, Zambia, and Zimbabwe:
www.seedingschools.org/

Food & Trees for Africa (South Africa) is a social enterprise that develops, promotes, and facilitates greening, climate change action, food security, and sustainable natural resource use, including permaculture:
www.trees.co.za/

Global Resource Alliance (Tanzania) is an all-volunteer organization sharing sustainable solutions to the challenges of poverty, malnutrition, and disease:
www.globalresourcealliance.org/

Kufunda Learning Village (Zimbabwe) is a model community designed to learn and demonstrate the solutions and innovations that contribute to self-reliant

and sustainable village and learning centers:
www.kufunda.org

The Klein Karoo Sustainable Drylands Permaculture Project (South Africa) is a nonprofit that conducts training in permaculture and other aspects of sustainable ecological living: <http://berg-en-dal.co.za/>

Sabina Home and School (a Ugandan home and primary school for OVC) uses permaculture to bring greater sustainability to the school and community:
<http://childrenofuganda-permaculture.blogspot.com/>

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