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LIFT: PERMACULTURE LITERATURE REVIEW

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Overview

A literature review was undertaken to understand permaculture activities and results. Below are the key questions reflected upon during the review, and overall summary of information found in response to each question is provided.

1. What are the (pre)requisites/factors for success/failure within targeted households?
   - Access to land may be needed in order for individuals to adopt permaculture activities; however, income and education do not appear to be a factor.
   - Training on permaculture design and implementation are needed.
   - An understanding of the benefits of permaculture is essential. This includes a need to dispel myths and address customs and stigma (e.g. excessive sweeping leads to cleanliness and 'bush plants' are associated with poor individuals).
   - Repeat exposure to permaculture and its benefits increases the likelihood of adoption of permaculture activities at the household level.

2. What contribution does permaculture make to annual household dietary needs?
   - Access to grown foods allows consumption of particular foods that may otherwise not be affordable/accessible.
     (Reference: *Greywater Reuse in Urban Agriculture for Poverty Alleviation: A Case Study in Jordan*; *Growing or connecting? An urban food garden in Johannesburg*)
   - Diversification of food helps ensure nutrition security (diverse diet) and a decreased reliance on cereal-centric diets.
     (Reference: AIDSTAR-ONE Technical Brief)
   - Contributes to year-round food security.
     (Reference:s *HIV and orientation of subsistence and commercial home gardens in rural Ghana: Crop composition, crop diversity and food security*; *Permaculture Adoption Among Malawian Farmers: A Positive Deviance Inquiry*)
   - Potential to reduce need on prescription food programming.
     (Reference: AIDSTAR-ONE Technical Brief)
   - Increases overall nutrition due to access to diverse foods.
     (Reference: AIDSTAR-ONE Technical Brief; *Home gardens focusing on the production of yellow and dark-green leafy vegetables increase the serum retinol concentrations of 2–5-y-old children in South Africa*)

3. What contribution does permaculture make to income and basic household needs, including food purchases?
   - Permaculture/home-based gardening decreases overall food costs, and can increase household income through selling of surplus items.
   - Certain activities (i.e. reuse of greywater) can reduce overall household costs as well.

4. What are the labor and input (opportunity) costs?

   Labor & Program Costs:

- Significant planning and design must be undertaken and the primary costs of permaculture interventions are associated with training and design.
- Permaculture Design Certificate (72-hour component based course) taught over 12 days with food, lodging, and travel covered. Can be delivered at approximately $35/participant/day. Graduates can become trainers after 2 years of implementation experience.
- A formal intro course (5 days) can be taught at approximately $10/participant (assuming no travel costs) – participants would be able to serve as a community support team to kick-start the process but would need a formal trainer to sustain implementation.
- Permaculture does not require understanding of botanical knowledge so community sensitization and basic intro courses can be conducted in varying contexts and integrated into extension courses for general community knowledge.
- Implementation requires varying upfront costs. Costs are based on the availability and state of local resources as well as the overall design (simple vs sophisticated). After local resources are exhausted, other resources/technologies should be evaluated for need and sustainability.
- Physical labor may be needed to prepare and rejuvenate the land. Costs can be mitigated if communities work together to provide resources, labor, etc.
- Typically, time and labor decreases significantly and food production increases as systems become self-sufficient. Benefits are typically reaped in the first 3-6 months.
- Specific resources needed vary based on design and local resources available. Plots are typically developed in zones (0-5) with infrastructure and items that need the most care close and items maintained with natural patterns further away.

Input Costs:

- Few (if any) input costs are provided – this is different from traditional feeding or agricultural programs.
- Sensitization on the 'whys' must be conducted to create community buy-in.
- Implementation should be innovative and exciting. Incentives should only be used if they are not viewed as handouts, but are not essential to implementation.
- Start-up inputs should be community or household donations.
- Use of public land space should be encouraged to foster a sense of community.
- Need to create an understanding of the benefits of agricultural diversification, not single crop staples (i.e. corn for cereal-centric diets).
- Must dispel myths of sweeping practices and that only poor people eat indigenous foods.

5. How replicable and sustainable is permaculture and what is required for replication and sustainability?
   - Low-input strategies that are easily replicable using local resources, without the need for outside funding are important for sustainability.
   - Encouraging multifunctionality is important. Plants, animals, and other elements should be used to provide food for people, for the soil, ground protectors, etc.
   - Community support and involvement is essential to sustainability of permaculture sites.
   - Increasing understanding of methods and reducing stigma/dispelling myths is important for initial engagement, expansion, and sustainability.

6. What environmental factors impact permaculture's potential success (i.e. soil and water requirements, plot sizes, etc)?
    - Explicit information on environmental factors and their impact on permaculture success was not found; however, one case study from a project in Jordan that used permaculture design to rehabilitate land that was negatively impacted by drought and high salinity in soil was found. This article has been added to the literature table.
    - Based on this case study and another of review of each article in the literature table, the following can be surmised:
        - Plant diversity contributes to increased food security due to the ability to cultivate and harvest year-round, diet diversity due to the variety of food grown (fruits, vegetables, legumes, etc), and control of pests due to differing plants and food sources for pests
        - Water requirements should be considered when planning permaculture projects. The potential amount of water recapture and irrigation needed should be considered when selecting which plants and crops should be planted, in addition to the climate factors.
        - Planting seasons of selected crops should be carefully planned to ensure that they flourish.
        - Plot size requirements are dependent on the scale of the project. Large-scale projects require larger plots of land. Smaller-scale projects and/or implementation of permaculture components (i.e. home garden or irrigation) require only small, if any, plots.

Table 1 – Literature Reviewed

Citation	Title	Literature Summary	Key findings	Comments
N/A		• Provides an overview of permaculture and its relevance to OVCs • Provides an overview of costs (labor and input) • Provides case studies of permaculture activities (summarized in Table 2)	• Permaculture has high upfront costs that decrease over time. • Has the potential to reduce need for food by prescription programming. • Training costs for certified trainers are significant ($35/participant/day for 12 days). • Basic intro training courses are less expensive ($10/participant) but participants would need to be monitored by a certified trainer to sustain implementation. • Garnering community buy-in is essential & education may be needed.	**Publication:** AIDSTAR-ONE Technical Brief (January 2012)
Faruqui, N., Al-Jayyousi, O., 2002	Greywater Reuse in Urban Agriculture for Poverty Alleviation: A Case Study in Jordan	• An IDRC-supported study estimated that 16% of the households in Amman practice urban agriculture, mainly for the production of fruits, vegetables and herbs. The annual value of UA in Amman is estimated at $ 4 million. • CARE Australia implemented a Permaculture Pilot Project (PPP) at a kindergarten – based on success, a new project was developed • A revolving fund was setup to loan money to 50 poor families in the area to set up PPP and greywater reuse systems in their own homes. Forty-nine of the 50 recipients were women • Evaluation was conducted using a detailed survey of 15 families who received loans and implemented the systems in their homes, to determine reuse habits, and the environmental, social and economic impact of the project (looked solely at the reuse of greywater in home gardens; animal husbandry was excluded) • 87% used the loan for plumbing modifications • 74% used manual methods to separate greywater (predominant source was kitchen sink but also collected from bathrooms)	• Loan repayment was 100%. • All households reduced their food expenses. • 1/3 generated income by selling surplus. • 10% of household income saved, while poorest saved 44%. • Municipal sources for this supplemental irrigation, on average, would have used 15% more water and had 27% higher water bills. • Average annual cost to collect greywater was $113 (varies on complexity of system and cost of seeds, if any). • Average net annual benefit is $376 (range:$170 to $615). • Provided useful employment skills & strengthened community. • Unrestricted irrigation with untreated water is not recommended. • 40% of the families consumed products that they would have otherwise been unable to afford. • Quality of the untreated greywater was adequate, and the negative impacts on soil and crops were negligible; however, if water quantities are increased, or if soils high in salinity or alkalinity are used, it could become significant.	**Publication:** Water International (Volume 27, Issue 3, 2002)

Citation	Title	Literature Summary	Key findings	Comments
Akrofi, S., Struik, P.C., Price, L.L., 2010	HIV and orientation of subsistence and commercial home gardens in rural Ghana: Crop composition, crop diversity and food security	• Empirical study to explore differences and similarities in biodiversity in subsistence and commercial home gardens of HIV-positive and HIV-negative rural households in the Eastern Region of Ghana and their significance in household food security • Household and home garden survey of a purposive sample of 32 HIV-positive and a random sample of 48 HIV-negative rural households; in-depth interviews	• In HIV-positive households, commercial home gardens were significantly larger, had significantly more species and individual plants, more perennial food crops and more species that were harvested all year round and evenness was lower. • More HIV-positive and HIV-negative households with a commercial home garden consumed a staple crop cultivated in the home garden in the 24-h period prior to the survey than HIV-positive households with subsistence home gardens.	
Wills, J., Chinemana, F., Rudolph, M.	Growing or connecting? An urban food garden in Johannesburg	• Project aims to provide vegetables and herbs for beneficiaries; empower the participants through education and training; create income generating opportunities; provide a model for replication for community gardens and the adoption of permaculture principles and organic methods. • Project comprised of 9 NGOs who provide ECDCs or care and support to PLWHA and others affected. • Project was given a plot of land of slightly less than a hectare; land was fenced with materials donated by steel company which together with gardeners. • Participants received training in soil preparation, organic planting methods and nutrition over 18 months. • In Year 1, Participants from each project provided 2–3 h of labor per week in the garden and each organization contributed about R100 per month to its development and upkeep. • In Year 2, a garden manager was employed for developing the garden and maintaining its daily operation and providing a security role by living on site. • Grows over 30 varieties of vegetables. • A central component of the evaluation was that the participants would describe and produce the evidence for the project's success or otherwise.	• Amount of produce/food output of the garden was not quantified. • Alternative access to the garden produce was beneficial as vegetables were otherwise only locally available at supermarkets, pre-packed and relatively expensive. • Peer networking was noted as extremely valuable; social and human capital increased • Sustainability is difficult due to lack of transport, financial and management resources – garden was designed for use by community, only the participating NGOs which cuts out community involvement.	**Publication:** Health Promotion International (Vol. 25 No. 1, 2009)

Citation	Title	Literature Summary	Key findings	Comments
Thorton, H., 2008	Permaculture Adoption Among Malawian Farmers: A Positive Deviance Inquiry	• Paper is a Positive Deviance Inquiry – PD is an "assets-based" approach to inquiry that focuses on identifying what resources communities are already using to improve livelihoods and overcome barriers. • Examined the agricultural practices of 27 Malawian farmers who have been exposed to Permaculture Nutrition and Design. • Identifies Permaculture adopters (positive deviants) and examines the factors and farmer characteristics associated with such adoption. • Study also examines household food security in Malawi and the extent to which it is affected by the adoption of Permaculture practices. • Data collected through interviews, survey instrument, and focus groups. • Respondents divided into two groups – adopters and non-adopters – through scores applied based on data provided in initial survey instrument. • Adopters and non-adopters chose to cultivate just a few indigenous/localized greens, significant opportunity exists for under-utilized plants to contribute to food security.	• Permaculture adoption is associated with age and land ownership but not with income or years of education. • Adopters have both increased their yields and improved their food and nutrition security. • Respondents indicated that food plants that "come from the bush" do not have to be cultivated. Additionally, a few participants alluded to the "shame" associated with eating "poor peoples' plants". • 78.6% of adopters believe that their yields per acre have increased compared to only 15.4% of non-adopters. • 78.6% of adopters reported 'never' running out of food in the household with no money to buy more (over the last 12 months) compared to 30.8% of non-adopters. • A 10 unit change in adoption score (out of 48) is associated with a 2.2 unit increase in Food & Nutrition Security Score. • Permaculture adoption is positively associated with acres owned; it is not however associated with income. • About 50% of those exposed, have adopted some portion of the Permaculture practices being promoted. • Only participants in the adopter category both grow and consume six food groups. • While land ownership/tenure was identified by participants to be a prerequisite for Permaculture practice and the biggest constraint to practice, this perception may not be well grounded in reality. 100% of participants own the land on which their houses sit, but only a few use the land immediately surrounding their homes for agricultural purposes. A common note was that plants and water should not be grown/stored near the house for fear of disease and dirty surroundings. • The method of exposure to Permaculture plays an important role in adoption – living near a site companied with a secondary source of exposure.	A Capstone Paper submitted in partial fulfillment of the requirements for a Master of Intercultural Service, Leadership, and Management at the School for International Training in Brattleboro, Vermont, USA.
Faber, M., AS Phungula, M., Venter,S.L.,	Home gardens focusing on the production of	• A home-gardening program was integrated with a community-based growth-monitoring system in a rural area in KwaZulu-Natal, South Africa.	• The number of gardens increased from 9 (baseline) to 126 (follow-up) - approximately 1/3 of all households. • 33% of the respondents appreciated the fact that they did	**Publication:** American Journal of Clinical Nutrition (76:1048–54,

Citation	Title	Literature Summary	Key findings	Comments
Dhansay,M.A., Spinnler Benadé, AJ, 2002	yellow and dark-green leafy vegetables increase the serum retinol concentrations of 2–5-y-old children in South Africa	• The aim of the gardening program was to address the vitamin A deficiency prevalent in the area by promoting the production and consumption at the household level of foods that are rich in provitamin A carotenoids. • The community-based growth-monitoring system provided the infrastructure that was needed for relevant nutritional education, home-gardening promotion, and training in agricultural activities. • Study determined whether the home-gardening program improved the dietary intakes of yellow and dark-green leafy vegetables and the serum retinol concentrations of 2–5-y-old children from this area. Growth and maternal knowledge regarding vitamin A were assessed as secondary outcomes. • Program was preceded by a period of sensitization and skill development. • The serum retinol concentrations and food consumption of 2–5-y-old children were determined at baseline and 20 months after implementation. A neighboring village under the same tribal authority served as a control village. • Project encouraged planting of yellow and dark-green leafy vegetables in addition to the crops already being planted. • Staggered planting, cyclic production, and crop rotation were promoted to ensure an adequate supply of provitamin A–rich foods throughout the year.	not have to buy vegetables. • 21% related the gardens to poverty alleviation. • Food security was the first priority of the households, and only 8% of the households with project gardens sold some of the produce for cash. • Percentage of children who consumed provitamin A–rich vegetables at least once a week increased (range:2-68%). • Serum retinol concentrations increased significantly in the experimental village but decreased significantly in the control village.	2002)
Prepared by Permaculture Research Institute of Australia for the report: *The Role of*	Jordan Valley Permaculture Project, Jordan (Case Study)	• Pilot project to rehabilitate 4 hectares of otherwise nonproductive farmland in the southern Jordan Valley, under high salinity and drought conditions, using the integrated sustainable design science of Permaculture. • Pilot farm was determined using standard surveying tools.	• The percentage of success of most trees/plants exceeded 90%. • Application of Permaculture design and planting inside the swales with heavy mulch has had a great impact on the success of crops in the farm. • Much less irrigation water was applied under the Permaculture design system, and water use efficiency	http://www.proactnetwork.org/proactwebsite/media/download/CCA_DRR_reports/casestudies/em.report.case_9.pdf

Citation	Title	Literature Summary	Key findings	Comments
Environmental Management and Eco-Engineering in Disaster Risk Reduction and Climate Change Adaptation: Jordan Valley Permaculture Project, Jordan		• Rainwater swales, irrigation dam, and water pump were developed and installed. • Planting of trees and plants was intentional – specific trees were planted to fix nitrogen in the soil and reduce evaporation (shade and wind shelter) & others were added for farm animal forage. • Extensive mulching techniques were employed to enrich the soil. • Pest control tactics were also part of the design including plant diversity (some plants to attract pest enemies and others to repel pests).	values surpassed those of conventional agriculture. • Soil salinity in swales was reduced, as compared to the beginning of the project. There was also a significant reduction in soil salinity before and after one year. • The use of natural mulching resulted in a decrease of soil pH. • Results of a selected analysis for some plants from the farm showed very low content of heavy metals, especially cadmium and lead where these metals are usually present in crops grown by farmers using chemical fertilizers. • 3 years later, permaculture ecosystems are well established on the farm. The farm is cultivated now with different productive crops which are used to generate income for the local community. At the household level, different crops are also cultivated to provide supplemental food for the families.	

Table 2– Permaculture Case Studies

Project	Program Details	Outcomes
Permaculture in School Curricula (Malawi), introduced to curricula in 2006, program piloted from 2007-2008, further evaluation to be conducted in 2012	• 1 year to design program (part of School Health & Nutrition Program) • Piloted in 2007 & 2008 in 40 primary schools, 11 teacher development centers, and 8 district teaching training centers • Trained over 150 permaculture educators (teachers, school management, agricultural extension works)	• Almost all schools reduced labor requirements & increased productivity (changed destructive habits of oversweeping & burning of organic matter; increased productive habits including mulching and caring for plants) • 2,500 trees plant in first year (3/learner) and other plants – included fruit, nut, & vegetable bearing trees and medicinal purpose plants • Less dust & mud, less erosion, and more water returning into the ground • All schools harvested some food, many experienced significant harvests – also included fuel wood (from branches) and seeds for planting • Surrounding schools, homes, hospitals, and others are copying the pilot schools activities
Growing Papaya to Support Vitamin A Deficiency (Nigeria), study conducted from 2003-2004, published in 2007 (not able to access full article)	• Looked at local sources of Vitamin A (in addition to supplements provided with foreign funding) • Papaya yields fruit in 1-2 growing seasons & is a good texture for 7 mos.-3 yrs of age • One fruit can yield hundreds of viable seeds that can be replanted and shared with others	No program has been implemented as of yet but potential outcomes include: • Within 1 year of a well-designed program, a community could be on its way to no longer relying on foreign assistance to address Vitamin A deficiency • Approach could be applied to other nutritional deficiencies - papaya seeds have also been used to eradicate intestinal parasites and contain over 100% of recommended daily Vitamin C • can bring in new sources of income - papaya trees also produce a latex that can be used for a variety of industrial and pharmaceutical uses
SEED Integrates Permaculture into Cape Town Primary Schools, SEED was founded in 1998	• SEED Organic Classroom Program is a 3-year program (design, practice, abundance) after which the permaculture system is sustainable • Facilitators mentor teachers weekly	• 22 partner schools • Implementing a wide range of activities including moving chicken tractor homes, fencing, solar water heaters, etc. • Schools are seeing results including feeding 950 learners 3x per week, fresh produce harvests a few times a week, etc. (See 2010 Annual Report for a complete listing of progress by school) Note: The program has expanded to Free State, Kwa Zulu Natal, Limpopo, Elim, Giyani; and plans to expand to the Eastern and Northwestern Capes; however, a case study of these sites has not been conducted.