Fachhochschule Köln
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UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ
FACULTADES DE CIENCIAS QUÍMICAS, INGENIERÍA Y MEDICINA
PROGRAMAS MULTIDISCIPLINARIOS DE POSGRADO EN CIENCIAS AMBIENTALES
AND
COLOGNE UNIVERSITY OF APPLIED SCIENCES
INSTITUTE FOR TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS

STRATEGIES AND CONCEPTS TOWARDS INTEGRATED NON-FORMAL ENVIRONMENTAL EDUCATION IN MEXICO

THESIS TO OBTAIN THE DEGREE OF
MAESTRÍA EN CIENCIAS AMBIENTALES
DEGREE AWARDED BY
UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ
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MASTER OF SCIENCE
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FOCUS AREA "ENVIRONMENTAL AND RESOURCES MANAGEMENT"
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SAN LUIS POTOSÍ, MÉXICO AUGUST 2011

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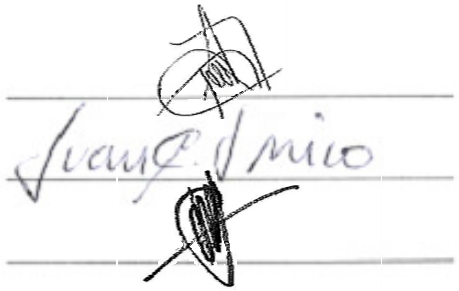

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UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ PROGRAMA MULTIDISCIPLINARIO DE POSGRADO EN CIENCIAS AMBIENTAL

UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ

CON EL APOYO DE:

DEUTSCHER AKADEMISCHER AUSTAUSCH DIENST (DAAD)

CONSEJO NACIONAL DE CIENCIA Y TECNOLOGÍA (CONACYT)

LA MAESTRÍA EN CIENCIAS AMBIENTALES RECIBE APOYO A TRAVÉS DEL PROGRAMA NACIONAL DE POSGRADOS (PNPC - CONACYT)

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ABSTRACT

The theoretical concepts of Environmental Education (EE), Education for Sustainable Development (ESD), permaculture and their practical implementation in Mexico are investigated by this study, analyzing selected integrated non-formal EE Projects (EEPs) and highlighting their strategies for sustainable resource management, capacity building, communication, organization and finance. It is shown that there are some significant EE efforts to be found in Mexico but that there is a shortage of well established EEPs in the city of San Luis Potosí (SLP), which faces a number of environmental challenges and would benefit significantly from an appropriate managed EEP. In order to recommend specific strategies and concepts for the development and management of an efficient EE Initiative (EEI), existing long-term EEPs in Mexico are analyzed.

The qualitative analysis is based on non-participative observation in order to provide a general overview of EEPs in Mexico. The analysis of five cases studies in Mexico, based on structured and participative observation, field visits, semi-structured interviews and a survey with participants from one of the projects, identifies structures and methodologies which have been implemented by those long-term sustainable projects promoting EE, illustrating that the integrated concept of permaculture achieves community building on different levels by focusing on communication and promotion strategies. Furthermore, the analysis of implementation and management of the projects depicts their strengths such as sustainable resource management, didactic methodologies and financial sustainability and allows a comparison within them. Based on the key findings of the analysis of EEPs in Mexico specific concepts and strategies are outlined which provide general recommendations for the efficient and sustainable management of integrated EEPs.

A first diagnostic of EE efforts in SLP, based on observation and communication, shows that projects should be improved in order to achieve a higher impact. Taking into account the key findings from the analysis of existing EEPs in Mexico and considering current EE efforts in SLP it is highlighted how EEIs could and should be improved and (re) designed in order to implement long-term sustainable change with multi-level stakeholder participation in SLP.

RESUMEN

Esta investigación explora diversos conceptos sobre Educación Ambiental (EA), Educación para el Desarrollo Sostenible (EDS), y Permacultura, y su implementación práctica. Para tal efecto se analizan y comparan algunos proyectos ecológicos integrales en México, así como sus estrategias en términos de manejo sustentable de los recursos, educación ambiental, comunicación y organización. Se subraya los esfuerzos de EA en México y su implementación exitosa pero también se destaca que hacen falta proyectos ambientales permanentes en la ciudad de San Luis Potosí, la cual enfrenta muchos desafíos ecológicos y que podría beneficiar en una manera significativa de iniciativas apropiadas. Para poder ofrecer estrategias y conceptos exitosos del desarrollo y manejo de un proyecto ambiental se analiza proyectos ambientales establecidos en México.

El análisis se basa en la observación non-participativa para detectar proyectos ambientales non-formales en México. Un primer diagnostico de la EA non-formal en la ciudad de San Luis Potosí, basado en la observación y comunicación interactiva con actores diferentes, muestra que los proyectos ambientales apenas están desarrollándose y deberían ajustar y modificar sus estrategias para lograr un impacto más significado. El análisis de cinco casos de estudios en México, basado en la observación estructurada y participativa, viajes de campo, entrevistas y una encuesta con los participantes de un proyecto, identifica estructuras y metodologías implementadas por proyectos establecidos y exitosos. El estudio de las estructuras y metodologías que han sido implementadas por los proyectos seleccionados muestra que el concepto integrado de la Permacultura logra una construcción comunitaria a niveles diferentes por el enfoque en las estrategias de comunicación y promoción. Se elabora un análisis que permite una comparación entre ellos para identificar las mejores prácticas como el manejo sostenible de los recursos y la sostenibilidad financiera. Basado en este análisis se desarrollan conceptos y estrategias específicos que se puedan aplicar como recomendaciones generales para un manejo eficiente de proyectos de EA.

Tomando esto en cuenta se muestra en un caso de estudio, la ciudad San Luis Potosí, cómo estas aplicaciones pueden incrementar el impacto de las iniciativas de la EA y cómo pueden/deberían influir en la planeación e implementación de un proyecto integral que pretende lograr un cambio sostenible de largo plazo y con la participación de los actores de niveles múltiples.

ZUSAMMENFASSUNG

Die vorliegende Studie untersucht die theoretischen Konzepte der Umweltbildung, Bildung für nachhaltige Entwicklung und Permakultur sowie deren praktische Umsetzung in Mexiko. Es analysiert eine Auswahl an integrierten informellen Umweltbildungsprojekten in Bezug auf ihr nachhaltiges Ressourcenmanagement und ihre Weiterbildungs, - Kommunikations, Organisations – und Finanzierungsstrategien.

Die Studie zeigt, dass viele informelle Umweltbildungsinitiativen in Mexico existieren; in der Stadt San Luis Potosí (SLP) jedoch, befindet sich die Umsetzung von Umweltbildungsprojekten erst in der Anfangsphase. Desweiteren wird aufgezeigt, dass aufgrund der zunehmenden Umweltbelastungen in SLP ein effektive geplantes Umweltprogramm notwendig ist. Um spezifische Empfehlungen für die Planung und Umsetzung eines Umweltprogramms geben zu können, werden vorhandene Initiativen in Mexiko untersucht.

Es werden Strukturen und Strategien analysiert, die in langjährigen erfolgreichen Umweltbildungsprojekten umgesetzt worden sind. Die Untersuchung von fünf Umweltprojekten in Mexico zeigt Managementstrukturen und Strategien auf, welche besonders erfolgreich sind durch ihren Fokus auf Kommunikation, Marketing und der Umsetzung des Permakulturkonzeptes. Die qualitative Analyse basiert auf strukturierte und partizipative Beobachtung, Exkursionen, Interviews und einer Umfrage mit Teilnehmern eines Weiterbildungskurses.

Die Analyse der Umsetzung und des Managements dieser Projekte weist Stärken wie zum Beispiel ein effektives Ressourcenmanagement, didaktische Lehrstrategien und ökonomische Nachhaltigkeit auf. Der Vergleich zwischen ihnen verdeutlicht den sozialen Wirkunggrad eines erfolgreichen Umweltbildungsprojektes. Darauf basierend werden Modelle und Strategien entwickelt, welche als Empfehlungen für das nachhaltige Management eines Umweltbildungsprojektes aufgezeigt werden. Anhand der Fallstudie San Luis Potosí gezeigt, wie Umweltbildungsinitiativen (um)gestaltet werden sollten, um verschiedene Interessengruppen mit einzubinden und einen nachhaltigen Wandel zu bewirken.

Dedication

This work is dedicated to my Mum who, no matter what, has always been there for me, supporting me in my dreams and aspirations. Who has guided me, giving me advise, strength, love and freedom. Freedom to explore the world, to get to know, to learn; letting me go, always waiting for my return, without expectations and with unconditional support, believing in me and my capacities. Without judgement. So independent and strong, with so much motivation and energy. She thaught me that the sky is the limit and everything is possible.

And to my grandparents who continue to be young in their heart, always seeking new challenges and adventures and who have showed so much understanding and interest in my way of living even though it is so different to their own. They never stopped making me feel special, since I was little and have deeply influenced my thinking and values.

Acknowledgement

These two years of this international Masters programme have been exciting, inspiring and at many times challenging. This opportunity to study abroad in Mexico has meant much learning, revising, critical thinking, new knowledge, new friendships, amazing experiences and would not have been possible without the financial support of DAAD and CONACYT.

I have found deep friendship with some of my fellow students (Clau, Clau and Greg) who share similar thoughts, visions and dreams, and especially the mutual support during the time of writing this thesis has been substantial. There have been many nights filled with laughter and happiness and the exchange of thoughts has helped to define own objectives and created a feeling of belonging.
Sofia Corripio has been more than a friend - she is my Mexican Mum and has supported me with advice, caring and understanding. Together we have explored possibilities of dreams and future plans, critically engaging with the Mexican realities and sharing the passion for yoga. Her magical card „espacio“ has given me strength when I needed it most, realizing that the truth, the way we are seeking, is in us.
The desert, rituals, temazcales, chanting and singing define my experiences of San Luis Potosí and I have met some incredible people (Javier, Paulina, Guz, Miguel, Manolo, Palomaris, Mauricio) seeking community, inner peace, harmony with and understanding of nature.
Similarly, this work which explores the concept of permaculture and its application has shown me that there are alternatives for sustainable change and different ways of finding happiness. It has opened a new horizon of possibilities. Holger Hieronomi from Tierramor has been particularly inspiring as he is an outstanding knowledgeable person who likes to share his experiences and passion for permaculture. He always had time for more questions and advises..

The process of writing this thesis has been especially challenging due to technical problems and there were times when I felt without strength to continue. Special gratitude goes to Lorena Leija and Laura Begbeder for their administrational support and to Maru, for being so patient and professional, saving my document so many times. During this time it was important to continue with the yoga and Diego Peña has offered me much motivation and perspectives in this sense.
Academically I would like to thank my tutors, Adrián Moreno Mata and Juan Carlos Torrico for their input, ideas and their patience. Dr. Aquilar, my assessor, has saved me in the last minute and made it possible to present this thesis in the given time frame. Lucy Nieto has formed my knowledge relating to environmental education and inspired me with conceptional maps.
Johannes Hamhaber has always impressed me with his knowledge and his passion, and offered me new perspectives and motivation. Andreas Böhler took the time for feedback and responded to my questions and doubts and has substantially supported me during my work.

CONTENTS

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ABBREVIATIONS

ANEA	National Agency of Environmental Education
BMBF	German Federal Ministry of Education and Research
CCA	Centre of Environmental Culture
CECA	Centers of EE and Culture
CECADESU	Centre of Education and Capacity for Sustainable Development
CONAFOR	National Commission for Reforestation
CONAGUA	National Commission on Water
DESD	Decade of Education for Sustainable Development
EE	Environmental Education
EEP	Environmental Education Program
EEI	Environmental Education Initiative
EROI	Energy Return on Energy Invested
ESD	Education for Sustainable Development
IFM	Integrated Farm Management
IUCN	International Union for Conservation of Nature
NAAEE	North American Association for EE
OA	Organic Agriculture
PEI	Institutionalized Environmental Project
RM	Resource Management
SEGAM	Secretary of Ecology and Environmental Management
SEMARNAT	Secretary of the Environment and Natural Resources
SEP	Secretary of Public Education
SLP	San Luis Potosí
SD	Sustainable Development
UASLP	Autonomous University of San Luis Potosí
UNEP	United National Environment Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WCED	World Commission on Environment and Development
WWOOF	World Wide Opportunities on Organic Farms

"It is not about what should be achieved but which of our dreams we want to realize"

*(*Durán, 1994 quoted in Muñoz, 2002: 74).

1. INTRODUCTION

In Mexico, as in most countries, there has been an increasing interest in the subject of Environmental Education (EE) and the transformation of its theoretical and practical context (Muñoz, 2002). This study focuses on the conceptual frameworks of EE, Sustainable Development (SD), Education for Sustainable Development (ESD) and permaculture; and investigates their practical implementation in Mexico. As shown by this investigation there is a growing number of Environmental Education Initiatives (EEIs) within the country and the accretive emphasis on permaculture within sustainable projects is notable (SEMARNAT and CECADESU, 2006). Nonetheless, the case study of San Luis Potosí, the capital of the federal state of the same name, illustrates that there is a lack of long-term permanent EEPs which translate public awareness into behavioral change. In order to propose and develop efficient strategies for the development and implementation of an Environmental Education Project (EEP) in SLP existing EEIs within Mexico are analyzed.

Currently there is little information available on the analysis of specific case studies, determining their impact or comparing different initiatives, taking into account what kind of specific strategies in terms of sustainable Resource Management (RM), EE, communication and finance function well or what kind of linkages exist between the several projects. In general, there is a lack of monitoring and evaluation (González-Gaudiano, 1999).

This study explores strategies and structure of EEPs in Mexico, highlighting that there are joint initiatives and coordinated strategies. It offers an analysis of five integrated non-formal EEPs in Mexico and examines their strategies for sustainable RM, capacity building, communication, organization and finance. It investigates structures and methodologies which have been implemented by long-term sustainable projects promoting EE. The analysis of implementation and management of those projects highlights their strengths and allows a comparison between

them. It further encourages the development of specific concepts and strategies which provide general recommendations for the efficient and sustainable management of an integrated EEP. Taking this into account it emphasizes, with the case study of SLP, how EEIs could and should be (re)designed in order to implement long-term sustainable change with multi-level stakeholder participation.

1.1. MOTIVATION

Within the framework of Education for Sustainable Development (ESD) projects are needed which "bridge theory and praxis" (Bode, 2009), and this is the case particularly for SLP because there is a lack of initiatives which translate public awareness into behavioral change. Environmental challenges call for an interdisciplinary and multi-sectoral community initiative which does not only focus on theoretical or academic discourse of EE but also on practical implementation and active participation; combining capacity building, technical assistance, taking into account social, political, environmental, local and global challenges. A concept is needed which offers a platform and meeting point where exchange and interaction referring to environmental theory and praxis is possible; which enhances communication and cooperation between different stakeholders, facilitating an exchange of information and contribution to the overall objectives of ESD. An integrated EEP is a valuable opportunity for San Luis Potosí of achieving long-term benefits such as active participation in the efforts of sustainable living, consumption and resource management.

1.2. GENERAL OBJECTIVE

The general objective of this study is to analyze and compare existing EEPs in Mexico and San Luis Potosí in order to elaborate specific concepts and strategies for the efficient implementation and management of an integrated EEP.

1.3. SPECIFIC OBJECTIVES

- To provide an overview of EEPs in Mexico
- To analyze five non-formal EEPs in Mexico and highlight their strategies in terms of RM, EE, communication, organization and finance
- To highlight best practices of existing EEPs, emphasizing specific concepts and strategies which improve performance and impact of an EEI
- To provide a first diagnostic of EEPs in San Luis Potosí
- To elaborate general recommendations for EEIs in San Luis Potosí in order to improve their impact

1.4. JUSTIFICATION

The analysis of existing EEPs in Mexico and the diagnostic of EEIs in SLP will facilitate the overall objective of offering recommendations and strategies for a sustainable environmental community project in SLP. The focus is placed on the analysis of EEPs in Mexico which have successfully developed over the past years. The purpose is to highlight the provisions, structures and methodologies that have been put in place for the development of integrated learning and sustainable living, and to elaborate guidelines and concepts for the successful implementation and management of an integrated EEP.

The theoretical design and recommendations for the planning and implementing of non-formal EEIs (see Nieto Caraveo and Buendía Oliva, 2008, Mayer, 2006) will be complemented with case studies, highlighting current efforts in Mexico within the framework EE. This allows an analysis and comparison of non-formal EEPs in Mexico and is an instrument for improving performance and continuity of such initiatives (Salazar, 2010). It enhances consciousness relating to efforts of sustainable living and education and is a tool for improving the quality of non-formal EE and for (re)designing projects.

2. CONCEPTUAL FRAMEWORK AND ITS APPLICATION IN MEXICO

This chapter explores the theoretical framework of environmental education, sustainable development, education for sustainable development, concepts of the environment and educational paradigms. It describes the objectives of non-formal EEPs and refers to monitoring and evaluation efforts of those. Also, the role of stakeholders within non-formal EEPs is mentioned. Additionally, the concept of permaculture is introduced as, which will be shown in this study, EEPs in Mexico increasingly focus on its application in order to promote sustainable living and learning.

2.1. ENVIRONMENTAL EDUCATION, SUSTAINABLE DEVELOPMENT AND EDUCATION FOR SUSTAINABLE DEVELOPMENT

"The goal of education is the optimal development of people, with emphasis on autonomy and critical thinking" (Sauvé, 1996:9). In this sense, EE considers the relationship networks of human-society-environment (Sauvé, 1996) with a sophisticated understanding of connections, causes and consequences (NAAEE, 2000). Transformation of EE in its theoretical understanding and practical implementation has been the process of the last decades (see Sauvé 1992 and 1996, Escutia y Mercado, 2008, Palmer, 1998) and its conceptualization has been the focus of many national and international meetings, conferences and agreements: the United Nations Conference on the Human Environment (Stockholm, 1972) emphasized environmental issues and led to the Tbilisi Declaration in 1977, which was the first intergovernmental conference on the topic of EE. The Brundtland Commission defined the concept of sustainability in 1987 and the Earth Summit in 1992 in Rio de Janeiro, with the United Nations Conference on Environment and Development, introduced the highly influential concept of Local Agenda 21 which refers to local action in order to achieve global sustainable change, and identified two main causes for the environmental degradation and the lack of sustainable development: poverty and wasteful consumption (González-Gaudiano, 1999). Other important intergovernmental meetings include the International Conference on Environment and Society (Thessaloniki, Greece, 1997), the

World Summit on Sustainable Development (Johannesburg, South Africa, 2002) and the International Conference on EE (Ahmedabad, India, 2007) (see NAAEE, 2000 and Nieto and Buendía, 2008). It is important to note that there exist many definitions for sustainability but commonly its understanding is defined as "a process that links social equity, economic growth and environmental protection" (González-Gaudiano, 1999:176), referring to issues such as population and economic growth; social justice and quality of the environment. The concept of sustainability, defined by the World Commission on Environment and Development in 1987, has caused much controversy over the years and much emphasis has been placed on the issue of sustainable consumption within the context of environmental education in the last decade as *"it is likely that a sustainable world cannot be achieved without a greater degree of equity. But a more equitable world would not necessarily be more sustainable*" (OECD, 1997a, A8 in Gonzáelz-Gaudiano, 1999). In this context, the United Nations and UNESCO declared the years from 2005 until 2014 the Decade of Education for sustainable development (DESD) and the World Conference on ESD (Bonn, Germany, 2009) proclaimed the necessity of integrating values, principles and practices of sustainable development into all education and learning (see Bode, 2009).

Figure 1 represents the development of different emphases within EE over the years, showing that the focus has shifted from nature and environmental studies towards development education and education for sustainable development.

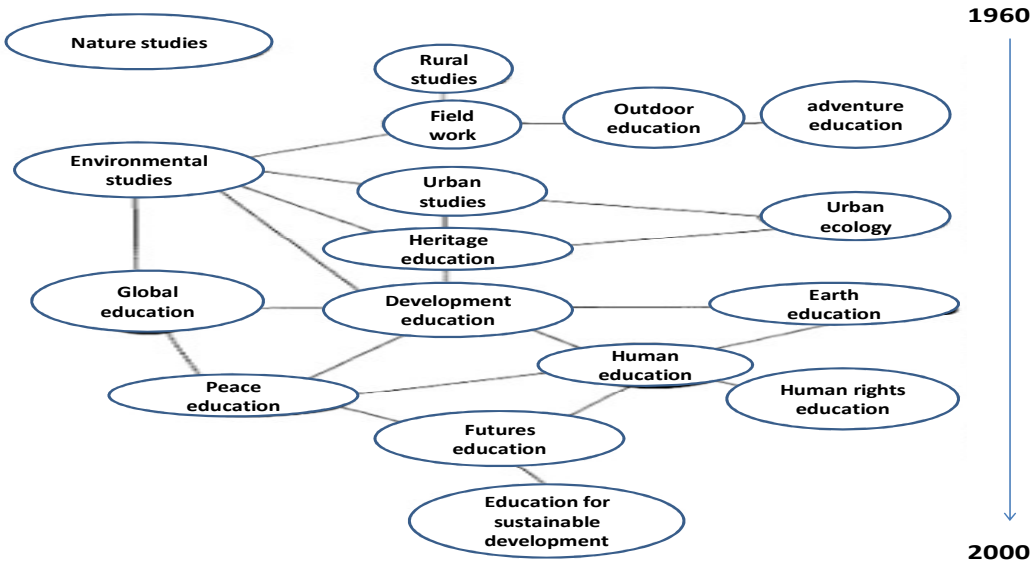

Figure 1: Development of different focuses within EE (Palmer, 1998:28)

ESD promotes a shift from unsustainable production and high consumption lifestyle to more satisfying, high-quality, low environmental impact lifestyles and social structures. It seeks experimental opportunities and solution approaches, embodying the "learning by doing" pedagogy. Taking action is one of the key objectives of ESD with the purpose of constructing concrete action plans, process of international collaboration, regional/national workshops and expanding networks. ESD initiatives include research, investigation, conferences, meetings, workshops, interactive projects, ecological centres and demonstration sites, implementing ecotechnologies and promoting sustainable agriculture; participation and communication strategies (see Wals, 2009). It encourages community building by interdisciplinary and holistic approaches within project planning and includes all stakeholders in society who should "actively engage and accept their share of responsibility" (Bogardi, 2009). Thus, Education for Sustainable Development promotes environmental awareness, knowledge and practice but also awareness about development in its broader terms.

New conceptions of sustainable development led to a rethinking of EE, its objectives and methodologies over the years. Nowadays, the focus is placed on holistic, interdisciplinary, integrated learning and various settings and teaching methods encouraging "cognitive, affective and behavioral outcomes" with a "commitment that allows active participation in decision-making" (Tal, 2005:575). It is defined by "hands-objectives and methodologies over the years. Nowadays, the focus is placed on holistic, interdisciplinary and integrated learning, various settings and teaching methods encouraging "cognitive, affective and behavioral outcomes" with a "commitment that allows active participation in decision-making" (Tal, 2005:575). It is defined by "hands- on, minds-on investigation" (NAEE, 2000:4) and direct experiences which allow the participant to actively learn from real-world contexts.

Table 1 describes how sustainable development conception has influenced the understanding and practice of EE and has modified educational paradigms. The emphasis within sustainable development was first placed on free trade and economic growth and nature was perceived as a resource to be developed and managed, yet increasing social and environmental problems has led to a restructuring of political, economic and social organizations, advocating global agreements and legislations in terms of (global) resource management, recognizing the failures of the neo-liberal system. This initiated the notion of a complete global shift in social values and choices,

encouraging autonomy, sustainable consumption and the perception of the environment as community project.

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Table 1: Typology of conceptions of sustainable development (Calgary Latin American Studies Group, 1994)

Sustainable development conceptions	Principal characteristics	Associated conception of the environment	Associated educational paradigm
Continuous development owing to technological innovation and free trade CREDO: economic growth following neoliberal principles will solve social and environmental problems.	Productivity and competitivity within a market-driven society; free trade on a world scale; scientific and technological innovation for economic growth; legislative control	Environment as a resource to be developed and managed; rational use of resources for sustainable profit, and thus sustainable quality of life	Rational paradigm: education as training, as an information transfer process (mainly of a scientific, technological and legislative nature)
Development as dependent on a world order CREDO: economic growth will solve social and environmental problems if a world order (from top organizations) regulates consumption, pollution and mechanism of distribution of wealth.	Free trade on a world scale; scientific and technological innovations for economic growth; restructuring of political, economic and social organizations: world or regional-wide pacts, agreements, legislation, etc.	The whole biospheric environment, as a pool of resources to be globally managed by top organizations	Rational paradigm: same approach as in previous SD conception, but acceptance of a certain critical approach of the failures of the neo-liberal system
Alternative development CREDO: only a complete global shift in social values and choices will permit the development of sustainable communities.	Development of bio-regional economy: distinguishing real needs from desires, reducing dependency, increasing autonomy, favouring renewable resources, stimulating democratic process, participation and solidarity, etc.	Environment as a community project	Inventive paradigm: a community-led process of critical investigation toward the transformation of social realities
Autonomous development (Indigenous development) CREDO: development is valued if it is rooted in cultural identity and if it preserves territorial integrity.	Collective subsistence economy based on solidarity, associated with one's territory and drawn from a distinct cosmology	Environment as a territory (a place to live) and as a cultural community project	Inventive paradigm: construction of contextually significant and useful knowledge, taking into account traditional values and know-how.

2.1.1. CONCEPTIONS OF THE ENVIRONMENT AND EDUCATIONAL PARADIGMS

Understanding and interpretation of EE are determined by the general conception of the environment. Sauvé (1996) has identified six conceptions of how environment was understood over the years (see table 2) and how this has influenced pedagogical strategies and methodology. He points out that there has been a shift from considering the environment as something to be protected and preserved for its aesthetical, ecological and economical value to a more integrated comprehension of environment as biosphere and community project. While the environment was before understood as a problem to be solved, analyzed and evaluated it is increasingly recognized as a "place to live" where transformation of reality must be achieved through own action and participation. Instead of solely transmitting predetermined knowledge it develops new knowledge based on critical and co-operative processes, considering the interpretation of challenges and solutions developed by the community. Sauvé notes that different perceptions of the environment related to educational discourses and practices have evolved over time but may also coexist. He further emphasizes the necessity of acknowledging those conceptions within integrated EE.

Just as conceptions of the environment are highly influenced by their socio-cultural conditions so are paradigmatic pedagogical approaches and visions of education. Sauvé (1996) includes the typology of educational paradigms, developed by Bertrand and Valois (1992), which explores the interrelations of socio-cultural and educational paradigms, their principal characteristics and approaches of educational methodology (see table 3).

Within pedagogical approaches there has been a shift from the transmission of predetermined knowledge mainly of scientific and technological nature based on formal presentations and demonstrations towards a more critical construction of knowledge taking into account social transformation and cooperative learning through considering grass roots movement and applying a more critical environmental education.

Table 2: Conception of the environment in EE (Sauvé, 1992)

Environment...	type of relationship	principal characteristics	examples of teaching / learning strategies
as nature	to be appreciated, respected, preserved	the original, "pure" environment; nature-as-a-cathedral; nature-as-a-uterus	• nature exhibitions; • immersion in nature
as a resource	to be managed	our collective biophysical heritage, sustaining quality of life	• 3Rs campaigns; • audit of energy consumption
as a problem	to be solved	the biophysical environment, supporter of life, threatened by pollution, deterioration	• problem-solving strategies • case study
as a place to live	to know and learn about, to plan for, to take care of	our daily living environment with its sociocultural, technological and historical components	• environmental story of our place • eco-gardening project
as the biosphere	in which we all live together, into the future	the spaceship Earth, object of planetary consciousness, a world of interdependence between beings and things	• case study on a global issue; • storytelling illustrating different cosmologies
as a community project	in which to get involved	a shared living milieu; the focus of socially critical analysis; a political concern for the community	• integral action-research (participatory process aimed at transformation); • environmental issue forums

Table 3: Typology of educational paradigms (Bertrand and Valois, 1992)

Sociocultural paradigm	Associated educational paradigm	Principal characteristics	Examples of EE pedagogical approaches
industrial: nature domination and competition for productivity and growth	rational	transmission of predetermined knowledge (mainly of a scientific and technological nature)	formal presentations or demonstrations; modules approach for training
existential: respect for nature, in search for harmony and personal accomplishment	humanistic	optimal development of the many dimensions of the learner; "freedom to learn"	confluent approach for nature education or environmental value education
symbiosynergic: toward symbiotic relationship between human, society and nature	inventive	critical construction of knowledge for social transformation; cooperative learning	"grass roots" EE; socially critical environmental education

2.1.2. NON-FORMAL ENVIRONMENTAL EDUCATION

Non-formal EE Initiatives[1] are recognized as one of the key features of ESD activity. Informal learning settings promote collective learning and can be highly diverse in their implementation. This includes learning in non-governmental organizations, study groups, community projects or social movements and "is characterized by being voluntary, by active participation and by the reciprocal exchange of ideas" (Wals, 2009:54). International institutions and organizations such as Earth Charter International, UN Inter-Agency Committee for the DESD and IUCN´s Commission on Education & Communication support informal learning initiatives promoting decentralized empowerment, capacity building, workshops, courses, meetings, conferences, dialogues, education material and investigation (Wals, 2009).

Other non-formal EEIs include urban organic agriculture, environmental promoters and centers, permaculture projects and transition towns, eco-communities and integrated farms. Eco-villages refer to communities implementing organic agriculture, sustainable development, eco-technologies, capacity building, ecology and permaculture. An integrated farm uses sustainable farming practices and applies ecotechnologies (see Schosseler, 2010) which promote an efficient use of resources, alternative energy sources and waste management, thus reducing resource and energy consumption. It encourages ecological housing, agrobiodiversity, and animal variety and is often integrated within eco-villages and communities.

2.1.2.1. Communities and stakeholders

Non-formal EE initiatives might focus on local involvement or global networking, targeting specific stakeholders or several groups within the community. Active engagement with the local community, with all actors of society, is highly important in order to create a communitarian sense of action and responsibility (Muñoz, 2002). Active participation of multi-level stakeholders, including civil society networks, the local community and international stakeholders is the main objective of EE and EEPs (Wals, 2009). Target groups within the local communities might be children, youths, adults, seniors, teachers, students or the economical less privileged. Additionally as described by Wals (2009:55), "in non-formal and informal settings,

[1] The term of non-formal EE might create the association of non-structured EE policies which are not formally recognized. This is not the case, instead it refers to EEIs which are promoted and implemented within informal structures.

the beneficiaries of stakeholder network include out of school children, underprivileged populations and people with disabilities". EEPs also focus on cooperation with educational institutions, UN agencies and government ministries and might seek financial support from the private sector or from public institutions. It is further recommended to actively engage with various media outlets such as television, radio, internet and with networks and partnerships (Wals, 2009). Muñoz (2002) points out that a collective construction of such project will enhance its legitimacy within society.

2.1.2.2. Monitoring and evaluation

Monitoring and evaluation are fundamental tools for measuring performance, quality and impact of a project. They allow a documentation and reflection about its implementation and represent an instrument of orientation, evaluation and certification (Mayer, 2006). ESD related activities usually implement internal evaluations, self-evaluation, program impact evaluations and annual reports (Wals, 2009). Nevertheless, as highlighted by many scholars (Mayer, 2006) more monitoring and evaluation of EPPs is necessary in order to determine impact and outcome of EE initiatives. In this context, sustainable development indicators have been developed even though their definitions vary and are complex (see Ospina, 2003).

2.2. PERMACULTURE

The concept of permaculture is explored in the following as there is an increasing application of its concept within EEPs in Mexico.

The term of permaculture (= permanent agriculture) was first introduced by Franklin Hirma King in 1911 when he described sustainable agricultural practices in Japan, Corea and China and was further developed as a concept in the 1970s by the Australian professor, Bill Mollison, and his student, David Holmgren, in Australia. "Permaculture One" was published in 1978 by Mollison and Holmgren and refers to an integrated agro-ecological concept. This approach was redesigned over the years with practical experiences showing that the social dimension was another aspect which played a key role in the concept of sustainable living and a holistic philosophy was integrated in the concept of permaculture (now permanent culture). The "permaculture Designers Manual" by Bill Mollison, published in 1988, explains the evolution of the concept in detail. During the 1990s there was growing interest in the subject of permaculture, and its concept was

increasingly applied in urban and regional planning, architecture, systems of production, the cooperative economy and within social and communitarian projects. Since then there has been a global permaculture boom. Also in Mexico there is an increasing force of permaculture projects.

Permaculture represents a concept of ethics and principles, which refers to the planning, developing, maintenance, organization and preservation of agricultural systems and human settlements. It focuses on organic food production, energy supply, landscape design, organization of social structures, emphasizing the use of renewable energies, the practice of land and nature stewardship, ecological, economical and social sustainable resources management (Mollison, 1988). The permaculture flower (see figure 2) shows the evolutionary spiral and its seven petals represent the main areas where principles of integration and transformation, based on less energy consumption, are applied. It defines how transformation towards sustainable change can be achieved by offering specific strategies such as the application of renewable energies, bicycles, continous action research, WWOOFing, yoga and other body/mind/spirit disciples.

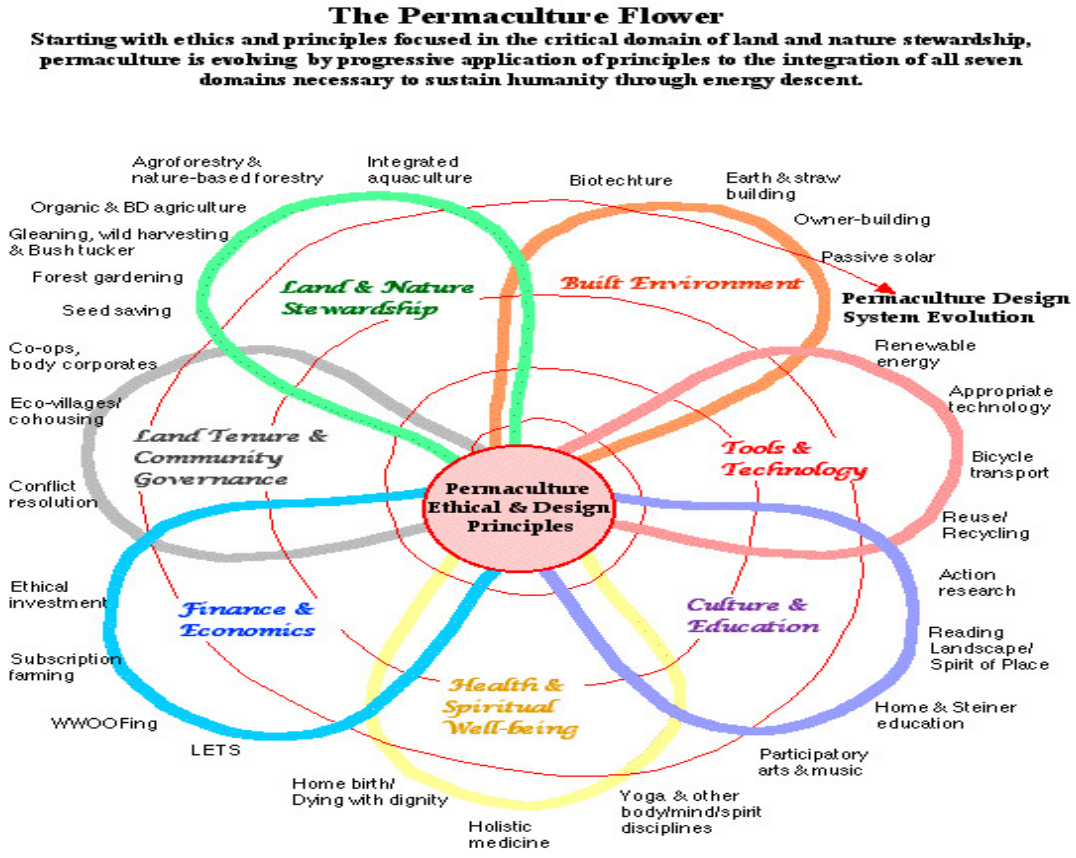


Figure 2: Permaculture flower (Holmgren, 2002)

Figure 3 represents the three ethical principles of permaculture: care for the Earth, Care for the people and Fair share. It also illustrates the twelve design principles, based on ecosystems ecology (deeply influenced by H.T. Odum) which "may provide a framework for continuous generation and evaluation of the site and situation specific solutions necessary to move beyond the limited successes of sustainable development to a reunion of culture and nature" (Holmgren, 2004:19). These design principles are based on methodologies and concepts developed by Mollison in 1988 (see appendix b) and have been further developed by Holmgren over the years.

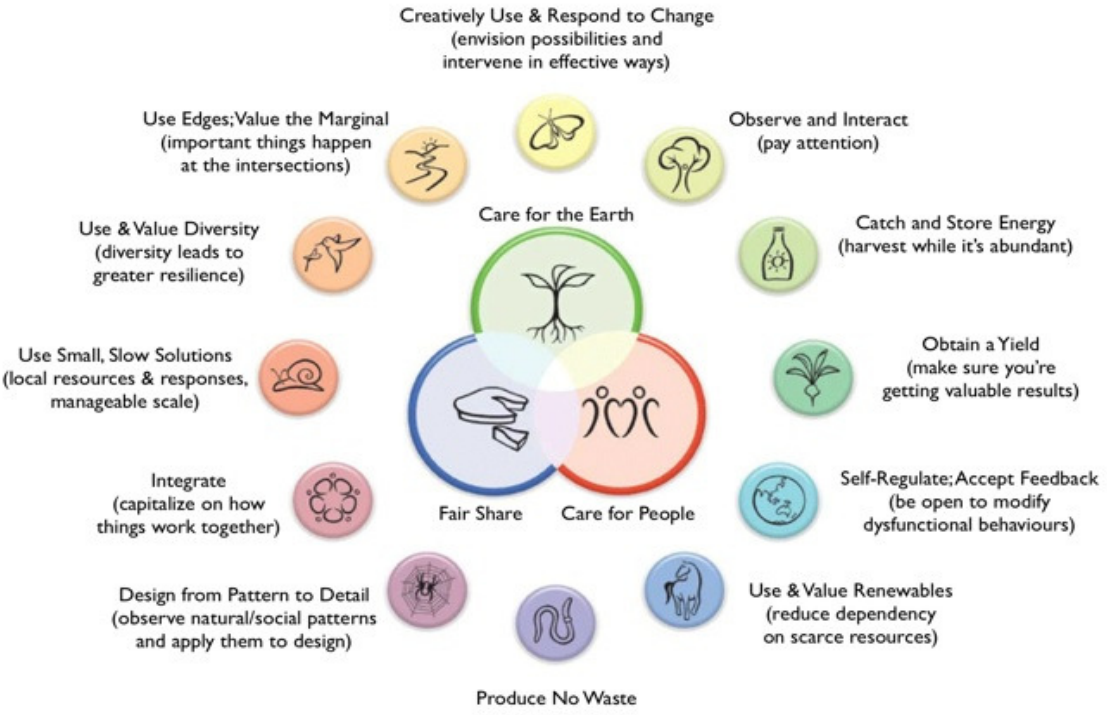


Figure 3: The permaculture ethic and design principles (Holmgren, 2002)

It recommends the OBREDIM methodology for the planning and management of a sustainable place (observation, boundaries, resources, evaluation, design, implementation and maintenance) and also considers structures, zones and patterns. The principle of the zones emphasizes the necessity to implement change from the centre, highlighting that transformation of values, ethics and practices must first occur within own spheres before transmitting those towards the local and wider community. Figure 4 illustrates that the objective of transformation can be influenced most within own spheres and is necessary in order to widen the impact towards other zones.

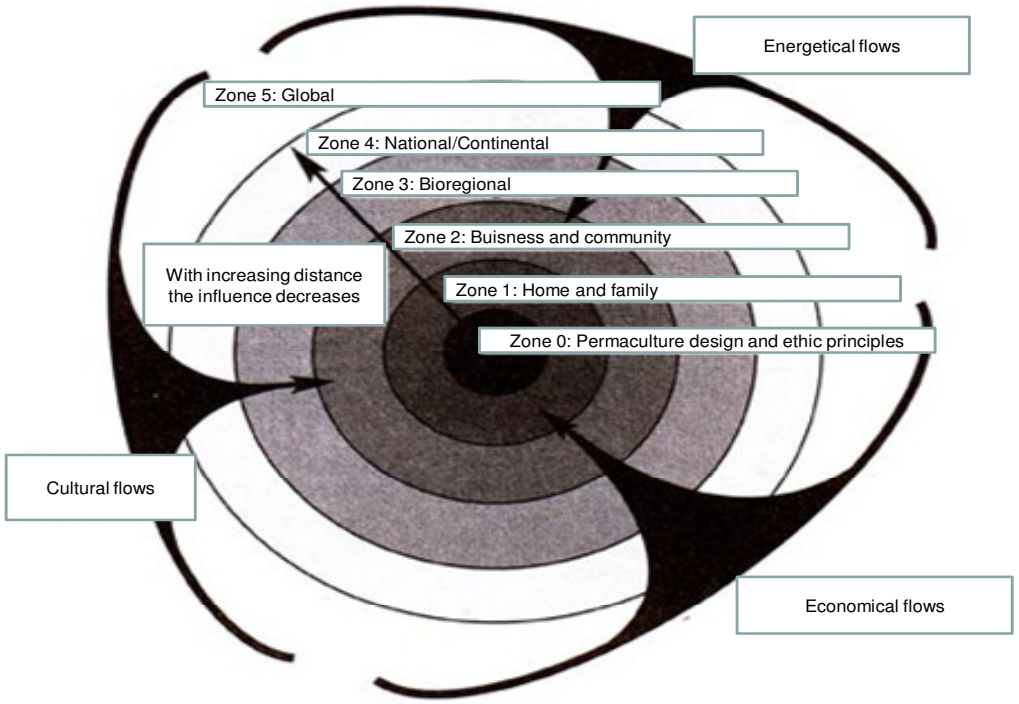


Figure 4: Permaculture Zones (Holmgren, 2002, modified)

The concept of permaculture shares many similarities with the objectives of education for sustainable development. Nevertheless, it is less focused on economic growth and rather emphasizes the importance of non-material values such as community building, spirituality and health. Its socio-cultural paradigm is defined by the call for transition (see Hopkins, 2007) because it is based on the belief that global and economical conditions and relations will drastically change due to the shortage of energy supply in the future (see Heinberg, 2003 and 2005; Campbell, 1997 and 1998). Therefore, permaculture promotes social transformation, critical analysis of the existing growth-based development models and the current status-quo of socio-economic systems, and reflects the concept of alternative development and development of sustainable communities (see table 3, Slocombe and Van Bers, 1992).

The relatively new transition concept, proposed by Hopkins, is "an emerging and evolving approach to community-level sustainability" (2008:134) which also includes the critical analysis of energy return on energy invested (EROI), also called net energy, and energy descent. It refers to the permaculture concept as a model for transition, highlighting the necessity of reducing

resource and energy consumption (Holmgreen, 2004 and 2007). Figure 4 shows the increasing decline in EROI for a range of energy sources, emphasizing that nowadays there is usually a high input on energy in order to obtain energy. It highlights that the frequently propagated alternatives for energy supply such as solar panels and biofuels consume a lot of energy in order to be produced and have a low EROI. Hydro energy, for example, achieves a relatively high net energy yet, most of the earth‘s potential hydro sites are already discovered and are less efficient due to drier summers caused by climate change (Hopkins, 2008). Trainer (2007) confirms that radical social changes are essential as renewable energies are part of the solution but cannot sustain a consumer society; a perspective which is also reflected within the permaculture concept.

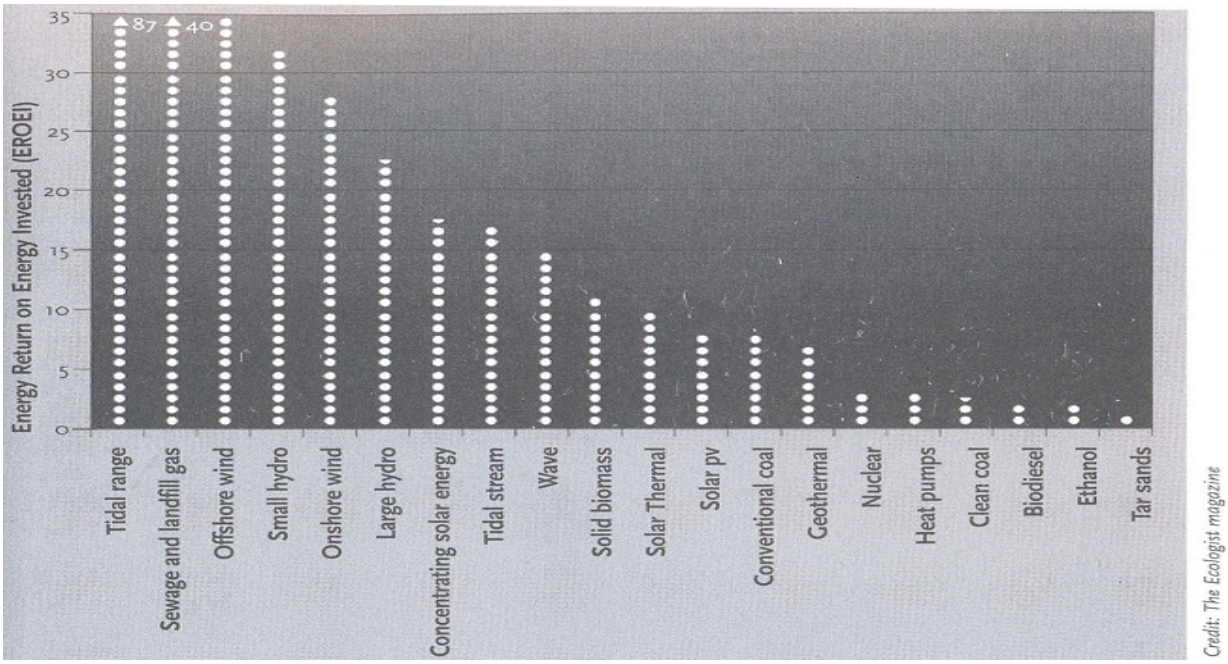


Figure 5: EROI for various energy sources (Hopkins, 2008:51)

The permaculture concept has inspired many in all parts of the world and permaculture conferences, meetings, rural and urban projects and even permaculture communities (eco-villages) have spread globally. Nevertheless, the permaculture network remains “largely unrecognized in academia” (Holmgren, 2007:3) and many of the initiatives are not supported by the government - it is a more independent development, “creating small local changes” (Holmgren, 2004:3) and represents a “quiet revolution” (Mollison quoted in London, 2005).

2.3. UPCYCLING

Upcycling means to add more value to old products, converting useless products and waste material into items of higher quality and better environmental value. Gunter Pauli (1999) describes the necessity of finding new ways of incorporating principle of nature within production processes, following a rotational cycle with zero emissions. New concepts of reusing and reevaluating raw materials are necessary for the future and are further described by McDonough and Braungart (2002) in their famous book "Craddle to Craddle: Remaking the Way We Make Things". The idea of upcycling is increasingly acknowledged and implemented within spheres of fashion, production and education.

2.4. WORLD WIDE OPPORTUNITIES ON ORGANIC FARMS

WWOOF (World Wide Opportunities on Organic Farms) brings together volunteers from abroad and local hosts and farmers in order to encourage the exchange of information, techniques, organic farming methods and to support community building on a local and global level. Woofers do not charge for their time donated, nor do the hosts charge for accommodation or food. Even though rarely mentioned within the context of non-formal EE, this world wide initiative provides EE within a real-world context and is also recommended within the permaculture context.

2.5. ENVIRONMENTAL EDUCATION IN MEXICO

The environmental, social, economical and political conditions and related challenges of the country have triggered much academic research, conferences and programs emphasizing the necessity of EE. It is observed that there is an *"exponential growth in the number of environmental educators, in their organizational and empowerment processes, in their penetration into different kinds of institutions and organizations, and in environment and recreational centers or the incorporation of EE into their work plans*" (González-Gaudiano, 1999:184).

In the same year (2005) in which UNESCO and the United Nations initiated the Decade of Education for Sustainable Development the Mexican Secretary of Public Education (SEP) and the Mexican Secretary of Environment and Natural Resources (SEMARNAT) formulated a national commitment in this context (see Nieto and Buendia, 2008). Nevertheless, the concept of

ESD initiated a critical debate, especially in Mexico and other Latin-American countries, as their previous interpretation of EE had focused on the importance of interrelations between the social, economical, ecological and political sphere (González, 2004) which was now defined as one of the main objectives of ESD. Rather than focusing on the term development (as we have seen, a complex and much interpreted term, often implying the notion of economic growth or certain social and political conditions), other recommendations have been made in order to stress the new objectives of EE such as "Education for a future" (Caride and Meira, 2001) or "Education for sustainability" (Nieto and Buendía, 2008). Furthermore, as emphasized by Nieto and Buendía (2008), during the process of the development of the new concept, Latin American countries expressed their concerns about losing previous achievements and recognition which have been realized within the scope of EE.

2.5.1. NON-FORMAL ENVIRONMENTAL EDUCATION IN MEXICO

An environmental education program, according to SEMARNAT (2010), refers to a proposal which seeks technical and political capacity building and awareness of environmental challenges within the framework of sustainability, considering site-specific social, cultural, technological and economical demands; of the present and the future. EEPs should further contribute to the development of competences which allow the participants to engage actively in concrete actions responding to environmental challenges (SEMARNAT, 2010). Non-formal EEPs "can be extremely diverse in their settings and in their target audiences" (NAAEE, 2000:1) and include programs such as forests, parks, educational centers, museums, workshops and ecological community building. The following refers to a few selected types of EEIs which can be found in Mexico.

2.5.1.1. CECAs, permaculture and eco-communities

Centres of education and culture (Centro de Educación y Cultura Ambiental, CECA) are integrated non-formal educational projects with a pedagogical team, specific infrastructure, resources and installations which respond to the needs of the users (Salazar, 2010). Furthermore, their mission is to instill environmental culture in various social contexts with the participation of different actors of society (Viadas, 2011). Those centers can be rural, urban or set in natural settings and initiatives also include botanical gardens, zoos and protected areas (see Muñoz, 2002

on recreational, learning and environmental culture centers). They provide a physical meeting point for recreation, relaxation, and the learning and teaching of environmental topics and challenges (see also SEMARNAT, 2010). CECAS promote EE by focusing on ecology, nature understanding and conservation. According to Muñoz (2002), environmental educators are often specialized in environmental science without considering social, political and pedagogical dimensions, even though SEMARNAT (2010) emphasizes the interdisciplinary approach of such centres which (should) take into account site-specific social and environmental challenges, including participative planning, innovative programs and didactic methodologies. At the same time SEMARNAT (2010) highlights the challenge of characterizing CECAs due to their diversity and the lack of systemized evaluation. Table 4 represents an overview of existing CECAs in Mexico according to Viadas (2011).

Table 4: CECAs in Mexico (adapted from Viadas, 2011)

Centro de Información y Comunicación Ambiental de Norteamérica (Ciceana)
Parque Ecológico Recreativo Gral. Lázaro Cárdenas. Flor del Bosque
Xochitla, Parque Ecológico
Museo del Agua, Agua para Siempre. Alternativas y Procesos de Participación Social A. C
Parque Africam Safari
Centro de Educación Ambiental e Investigación Los Alamitos
Centro Ecológico Los Cuartos, el Centro de Educación Ambiental y Protección Civil Quetzalli
Centro de Educación Ambiental Acuexcómatl
Centro de Educación Ambiental Ecoguardas
Descubre, Museo Interactivo de Ciencias y Tecnología
La Escuela Municipal de Educación Ambiental Parque México
Parque Xcaret
Parque Xel-Ha
Parque La Ceiba
Corazón de Playa

In Mexico there are an increasing number of eco-communities and villages, even though academic research on those is still limited. An outstanding contribution is the publication by SEMARNAT and CECADESU (2006) which includes many articles by founders and members of eco-communities and EEPs in Mexico, analyzing topics such as bioconstruction, ecotechnologies, participative organization and education, holistic vision, spirituality, community building and sustainable living. The concept of eco-villages refers to communities promoting

organic agriculture, sustainable development, eco-technologies, capacity building, ecology and permaculture. Also integrated farms (often part of eco-communities), characterized by organic agriculture, improved soils, stability and resilience due to cover crops, legume intercrops, manure, compost and continued breeding of crop varieties (Spedding, 2006, Montiel, 2005), have become increasingly popular. They contribute to climate change mitigation through sequestration of soil carbon and advocate the objectives of EE and ESD through commitment to communication, training and involvement. Also increasingly popular are organic farms which promote active community building and offer knowledge exchange with WWOOF Mexico.

Thus, there is a growing number of urban and rural projects to be found in Mexico promoting the objectives of EE and ESD (see Table 5 and appendix a). Additionally, it is notable that the permaculture movement is growing strong – a field which is often neglected within academic research of EE and ESD, even though it shares many ideas and objectives. Reviewing this data it can be observed that none of the projects are based in the federal state of San Luis Potosí.

Table 5: Eco-communities and permaculture movement in Mexico (adapted from www. caminosostenible.org)

Eco-communities in Mexico	
Ecoaldea Huehuecoyotl	Tepoztlán, Morelos
Ecovillananda	Oaxaca
Los Guayabos – Comunidad Ecológica	Zapopan, Jalisco
Los Horcones – Comunidad Walden Dos	Hermosillo, Sonora
Pueblo Sacbe	Playa del Carmen, Quintana Roo
Tehuantin	Tepoztlán, Morelos, México
Projects in Mexico: Spirituality and holistic life	
Ixixtlan	Atlixco, Puebla
Iztac Multiversidad	Municipio de Amecameca, Mexico
Nierika	Chalmita, Ocuilan, México
Tashirat	Tepoztlán , Morelos
Yiimtii- Eco Retreat Center	Huatulco, Oaxaca
Yolitia	Malinalco, México
Projects in Mexico: Ecotourism	
Genesis Retreat Eco Oasis	Yucatán
Rancho Viva	Jalapa, Veracruz
The Bosque Village	Malinalco, México
Urban EE projects	
Calle Rocio 54	Morelia, Michoacán
Ruta Ahimsa	Queretaro, Queretaro
Sembradores Urbanos	D.F., México

2.5.1.2. Monitoring and evaluation

Current evaluation efforts of sustainable non-formal educational projects in Mexico, especially with case studies, are rather limited. Nevertheless, recently there has been an increasing interest of scholars and institutions to investigate methods and strategies of non-formal EE Projects in order to ensure quality and continuity. The lack of monitoring and evaluating of non-formal EE has also been recently recognized by SEMARNAT which proposes the evaluation non-formal EE and cultural centers (see Viadas, 2011). The proposed evaluation model by SEMARNAT considers five dimensions: administration, organization and financing; infrastructure; environmental teaching program, the pedagogical team and didactic material; the environmental dimension taking into account efficient use of resources and waste management; and the social dimension referring to community building and active participation in socio-environmental solutions (Viadas, 2011). Also Salazar (2010) describes the importance of such evaluation models and highlights the necessity of a pilot project, analyzing 24 CECA in Mexico.

Mayer (2006) recommends the investigation of quality of EEPs by researching their structures (infrastructure, installations, and sustainable ways of living, education), organization (internal and external relations), mission and functions. SEMARNAT and CECADESU (2006) recommend as evaluation strategy the identification of problems and challenges and the analysis of its causes in order to develop solution proposals.

A highly interesting account, yet not based on specific examples is the evaluation of Muñoz (2002) of CECAS in Mexico. He criticizes the informal education initiatives and states that those centers often lack an interdisciplinary approach, taking into account environmental pressures but not emphasizing the linkage between those and social and political conditions of a place. He argues that those initiatives are often limited within their work and impact and do not reflect Latin American perspectives and necessities. The political discourse and the cultural understanding of nature and environment is often ignored, with educational efforts focusing on a simplified ecological interpretation of challenges and activities such as recycling and composting – without the contextualization of cultural diversity, economic development, holistic education, social and political structures. Muñoz also argues that only few of those educational centers in Mexico represent a symbol of collective identification and communitarian action and highlights the necessity of developing better strategies of communication and organization, involving more actively the participants in the process of EE. Instead of offering a set agenda with specific

programs and workshops he recommends an active community building and participation strategy which emphasizes active reflection, between others, about reasons and consequences of the loss of biodiversity, environmental services and indigenous knowledge.

Muñoz further criticizes their theoretical perceptions and practical implementation and offers specific recommendations of how those should be improved. He introduces the concept of an institutionalized educational project (Proyecto Educativo Institucional) which is defined by the proposal of a critical reconstruction of reality with a socio-cultural purpose; a place of ideological definition, political resistance, social values and principles; the idea of an ideological organization; a philosophical collective; a combination of its ideas and dreams. It is an initiative which offers the opportunity of discussing, valuing and criticizing the educational proposal, taking into account new realities and transforming problems into opportunities. Muñoz also recommends a so called master plan (Plan Maestro educativo) which refers to the "spirit" of the project, thus guiding the project´s programs, activities and educational interventions. It allows a critical reflection about limits and challenges of the project and promotes a continuous evaluation of strategies and their impact, emphasizing the environmental complexity and the integration of social transformation and political thought. He calls it an integrated process of defining challenges and solutions, communicated to and from the community.

Furthermore, he confirms the need for continuing research and investigation on those informal educational environment centers as their quality differ due to the lack of a specific profile, capacity building for instructors and low financial profit. There is little systematization of their work, shortage of evaluation and monitoring, poor diffusion, publicity, public relation and institutional legitimacy.

In general, there is a shortage of qualitative evaluation efforts and impact studies of selected projects or comparisons between them which would allow an analysis of existing sustainable programs in Mexico. Instead there are manuals and guidelines available of how to elaborate integrated EE centers and projects (see SEMARNAT, 2010, NAAEE, 2004, Nieto and Buendía, 2008), yet without reference to specific case studies on which the recommendations are based on.

2.6. ENVIRONMENTAL EDUCATION IN SAN LUIS POTOSÍ

San Luis Potosí (SLP), the capital of the state San Luis Potosi in Mexico, is located 100º58' west longitude and 22º09' north and is situated 1,850 meters above sea level with an average annual precipitation of 378.7 mm per year (Ledesma, 2009).

Figure 6: The state of SLP within Mexico (www.luventicus.org)

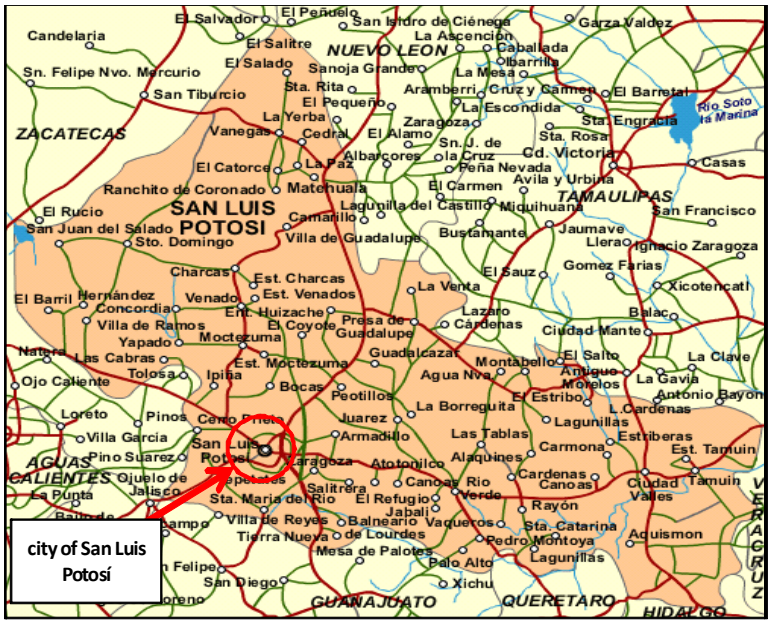


Figure 7: The capital of the federal state of San Luis Potosí (www.mapas.mexico.net)

San Luis Potosí is the tenth-largest metropolitan area in Mexico with an approximate population of one million inhabitants in the metropolitan area (INEGI, 2005). Figure 8 shows that the urban agglomeration of SLP has experienced a rapid and steep extension in the last decades, growing from 1.760 hectares in 1960 to over 14.000 hectares in 2000 due to the industrial development of the city and urban settlement (Semarnat, Cotas and Conagua (2005). The industrial development of the area of the last decades has had an immense impact on the environment, natural resources and human health due to significant land use changes which have resulted in an steady decrease of the aquifer and worsening conditions of the soil, creating major run offs instead of water infiltration (Maza and Santacruz, 2010). The climatic characteristics of San Luis Potosi such as low precipitation, high evaporation and low access to superficial water sources mean that water in general is scarce. Rural-urban migration has lead to the abandonment of crop land and traditional (sustainable) agricultural practices (see López et al., 2006). Domestic, industrial and agricultural

waste water and the lack of waste water treatment contaminate the soil and the groundwater reduces the availability of drinking water (SEMARNAT, 2006).

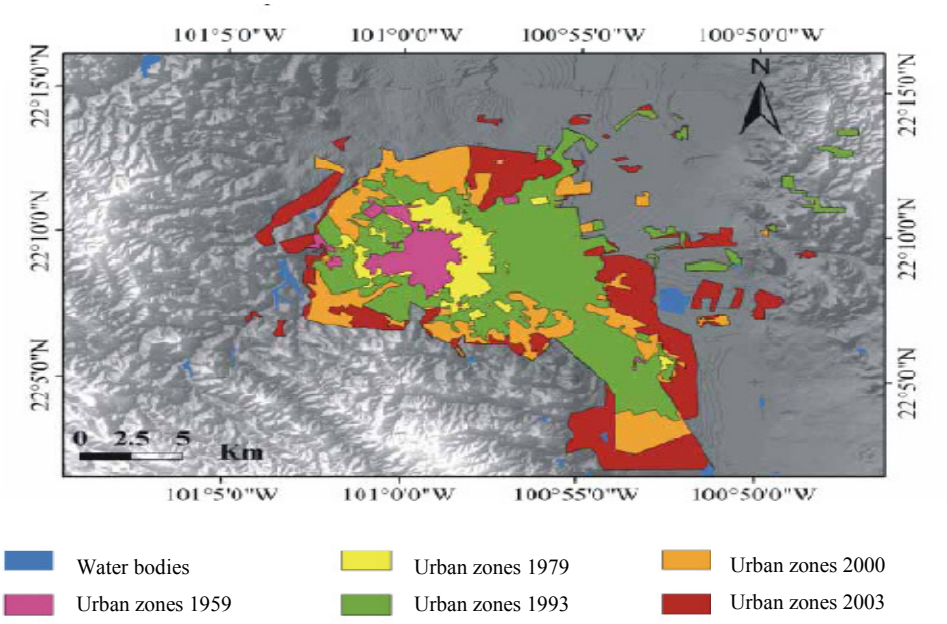


Figure 8: Urban growth, San Luis Potosí (Noyola-Medrano et al., 2009, modified)

Within the last decades there has been much controversy in San Luis Potosí about the set up of chemical industries and multinationals, causing high environmental impact, and about land use changes due to the (illegal) operations of mining companies within protected areas. The example of the Mine San Xavier (MSX) shows that multinational companies are able to operate without legal permissions and with huge environmental costs for the area, highlighting the problem of corruption and inappropriate political administration.

Thus, San Luis Potosí faces increasing environmental, economical and social pressures, which are defined by inappropriate resource management and inadequate urban planning. Within the sustainable development efforts there is a lack of appropriate policies, investigation, infrastructure, interdisciplinary interaction, connection and corporation between the different sectors (SEMARNAT, 2006).

Therefore, efficient EE in SLP is essential and an increasing awareness of the necessity of EE is observed based on the growing numbers of academic investigations, programs, conferences and workshops. New university studies such as environment communication, engineering and management highlight the concern of environmental deterioration and the interest in sustainable

development and has led to the formation of a working group with members from the Autonomous University of San Luis Potosí (UASLP), Secretary of Ecology and Environmental Management (SEGAM), Secretary of the Environment and Natural Resources (SEMARNART) and Secretary of Governmental Education of the State (SEGE) (see SEMARNAT, 2006). Furthermore, the National Academy of Environmental Education (ANEA) and the Centre of Education and Capacity for Sustainable Development (CECADESU) work closely together with the UASLP in order to initiate sustainable courses and programs in the region.

2.6.1. NON-FORMAL ENVIRONMENTAL EDUCATION IN SAN LUIS POTOSÍ

In general, EE efforts in SLP have mainly concentrated on academic programs, research, courses, diplomas and degrees rather than on non-formal educational communitarian long-term EEIs which actively involve different actors of society such as governmental institutions and the citizens of SLP (SEMARNAT, 2006). There is a lack of action, communication, participation and continuity, partly due to the political instability, lack of local investment and lack of social commitment (Nieto, 2004). Non-formal EEPs exist to a limited extend and will be highlighted in this study. This investigation does not take into account museums, zoos or parks promoting EE even though they are listed by SEMARNAT (2006) within its EE diagnostic. Instead, this study concentrates upon independent community projects which promote the active exchange of knowledge based on community building initiatives and capacity building. In this sense, some permanent sustainable environmental community projects have initiated in SLP, such as the environmental ambassador program, which promotes capacity building by university students, but information about their objectives, methods and impact is limited (SEMARNAT, 2006).

3. METHODOLOGY

This chapter describes the methodology applied for this investigation, identifying processes of data collection and implementation of research methods. As mentioned by SEMARNAT (2006), evaluations of EEPs rarely consider all aspects which should be taken into account and this investigation focuses mainly upon the social impacts an EEP might generate. Furthermore, the review of existing long-term EEIs highlights not so much weaknesses of those (as recommended by SEMARNAT, 2006) but focuses on their strengths, considering strategies and methodologies which are successful and might (should/could) be applied by other EEPs. Thus, it "attempts to generate general guidelines that can be used in contexts other than the ones in which they were generated" (Wals, 2009:11). Therefore, the purpose of this analysis is not necessarily to rank, label or judge EEPs but rather to emphasize the provisions and structures that have been put in place as recommended by UNESCO (see Wals, 2009).

3.1. DATA GENERATION AND ANALYSIS

The research investigates independent EEPs in Mexico and does not take into account projects promoted by the government in order to limit the scope of the analysis. The study focuses on permanent initiatives with a physical place and set location and an interdisciplinary and integrated approach of transmitting EE. Additionally, in order to explore strategies of sustainable resource management such as organic food production and ecotechnologies the emphasis was placed on EEPs which promote and implement integrated farming.

The literature review places this work into its conceptual framework and explores concepts of EE, ESD and permaculture. With regards to the objectives of this study it provides information on EEPs in Mexico such as eco-villages and environmental learning centers. Also, it highlights current efforts of evaluating non-formal EE centers and takes into account recommendations of other scholars of how to elaborate EE Projects. The literature review is based on secondary data obtained from journals, books, academic studies and internet publications.

Own conducted research is divided into two parts. The first part investigates what kind of non-formal EEIs exist in Mexico, offering a general overview. Additionally a detailed study of five

selected EEPs analyses their methodologies in terms of sustainable resource management, educational practices, communication, organization and finance. The second part provides a first analysis of current projects offering EE in San Luis Potosí. Primary data is generated through internet research, field visits, meetings, observation, photos, video footage, and qualitative research such as semi-structured interviews, a survey and communication with local actors.

It must be kept in mind that to investigate a complex system means to research only a part of reality and is influenced by the researchers understanding of concept and theory (see García, 1986). "The process of observing influences reality, and (...) we must always be circumspect about absolute truths and values" (Holmgreen, 2007:6).

Several forms of observation patterns and qualitative analysis approaches have been used for conducting this study and are described briefly in the following.

OBSERVATION

Observation, an ethnographical research method, is a process of investigation which allows a more comprehensive understanding, examining the study focus within its native environment. Gorman and Clayton (2005) describe observation as "the systematic recording of observable phenomena or behavior in a natural setting" (quoted in Baker, 2006:2). Also perceived as a data collection technique (Williamson, 2000 in Baker, 2006), it reflects information not directly expressed by the participants but observed by the researcher. It provides information in form of notes, photos or video recording "with the object of evaluating a system" (Erbe, 2011:38). It includes a certain investment of time at the research location and direct involvement with the stakeholders even though it is fundamental that the researcher remains "detached enough to collect and analyze data relevant to the problem under investigation" (Baker, 2006: 1). Thus, the role of the researcher impacts on the results of the studies and should be reviewed critically. Furthermore, observation methods make generalizations difficult due to a small number of settings.

Different forms of observation patterns are recognized (see Baker, 2006 for a more distinguished observational research methodology analysis) and the following represents a selection of the observation methods applied in this investigation:

a) Structured observation: before established categories are used to guide the observations (Glazier, 1985).

b) Non-structured observation: there are no organized categories of observation, no specific rules apply, the observer collects unstructured information, and thus there is the risk of selective perception (Alston & Bowles, 2003).
c) Participative observation: the researcher is involved as an active part of the investigation and participates in activities and interaction with the researched with the limitation that the observer may influence the studied behavior and might become less objective (Alston & Bowles, 2003).
d) Non-participative observation: there is no involvement with stakeholders; data is generated from an entirely different environment (Spradley, 1980).

The first part of the analysis, referring to EEPs in Mexico in general, has used the methodology of non-participative observation, collecting information entirely from the internet, focusing on objectives of the project, course topics, course costs, other services, volunteer participation and internet profile. It refers to projects in Mexico which promote sustainability, agroecology and permaculture and are recommended by the website http://caminosostenible.org/. This website was used as main source as it offers a good summary of EEPs in Mexico and is regularly updated.

Structured observation was applied for the five projects visited: categories of specific topics were outlined previous to the research focusing on sustainable resource management and strategies of EE, communication, stakeholders and finance in order to guide the observations.

In order to further research strategies of EE two projects (Las Cañadas and Tierramor) were visited as participant of a course for five days. In this way additional research was conducted about didactic methodologies, topics, course organization and quality of the instructors based on participative observation. This also explains why more information regarding strategies of EE as been gathered for Tierramor and Las Cañadas, observing patterns of participation, communication and community building.

SEMI-STRUCTURED INTERVIEWS

In comparison to a structured interview and limited set questions semi-structured interviews are more flexible as they allow new questions within the interview process and are based on a general framework of topics and themes to be researched (see Lindlof and Taylor, 2002). This methodology was applied for the five investigated projects (Tierramor, Las Cañadas, Rancho

Acayali, Las Canoas Altas and CEDER). During personal conversations with the founder of the projects it was focused upon the following topics: history, objective and mission of the project; what kind of installations (ecotechnologies), infrastructure (farming practices) and further initiatives of sustainable resource management are promoted and how; involvement of stakeholders with special emphasis on volunteer management; EE (topics of courses and other services); communication strategies and finance of the project. Notes were taken while the interviewee spoke freely about the outlined topics. Information from observations and semi-structured interviews was manually coded and structured in form of a table which facilitates an overview and a comparison between the different EEPs.

QUALITATIVE SURVEY

Qualitative surveys focus on open-ended questions rather than on a set of pre-established answers. Open ended-questions are used in order to investigate spontaneous, individual responses rather than suggested ones (Reja, Lozar Manfreda, Hlebec and Vehovar, 2003). A qualitative survey was conducted in order to investigate viewpoints from the participants of the "ecotechnology and renewable energies" course at Las Cañadas, one of the five investigated projects. Instead of multiple choice questions there was no limit of how many answers the respondent could give. This offers a wider scope of analysis as it does not limit the participant in its answers but at the same time it made necessary to find categories for similar answers. When asked about general gains of a sustainable EEPs for example, answers such as regeneration of soil and ecosystems, environmental recuperations, sustainable resource management and waste recycling were included in one category: to encourage less impact on the planet. This was important in order to recognize certain tendencies within the given answers but also implies personal interpretation of the author.

COMMUNICATION

Communication such as personal dialogue, conversation, and interaction to local stakeholders has been the main methodology for investigating EEPs in SLP. Through talking to people and explaining the objectives of this study and referring to information gathered about other EEPs in Mexico environmental movements and projects in SLP were described and recommended. Due to living in SLP for one year key stakeholders could be identified, taking into account actors

interested and active within environmental movements (especially students, young people and teachers). As is shown by this study the planning and management of non-formal EEIs in SLP is a rather recent development, thus information is not easily available. Only through interactive communication it was possible to find more information about EEIs (which mainly use the new media webtools[2] such as Facebook and blogs.) Also personal contact to some EEPs was initiated such as ALCYED, Biobab and Reco in order to find out more about their objectives, methodologies and interlinkages with other projects. The information obtained is presented in form of a table, emphasizing location, type of project, source of knowledge about the initiative, objectives and additional comments.

Figure 9 summarizes the above mentioned methodologies applied for this research, highlighting that the analysis and comparison of EEIs in Mexico will elaborate general strategies, concepts and models which, by taking into account current efforts of EEPs in SLP, will help to define specific recommendations for the improvement of existing projects and efficient planning and management of new ones.

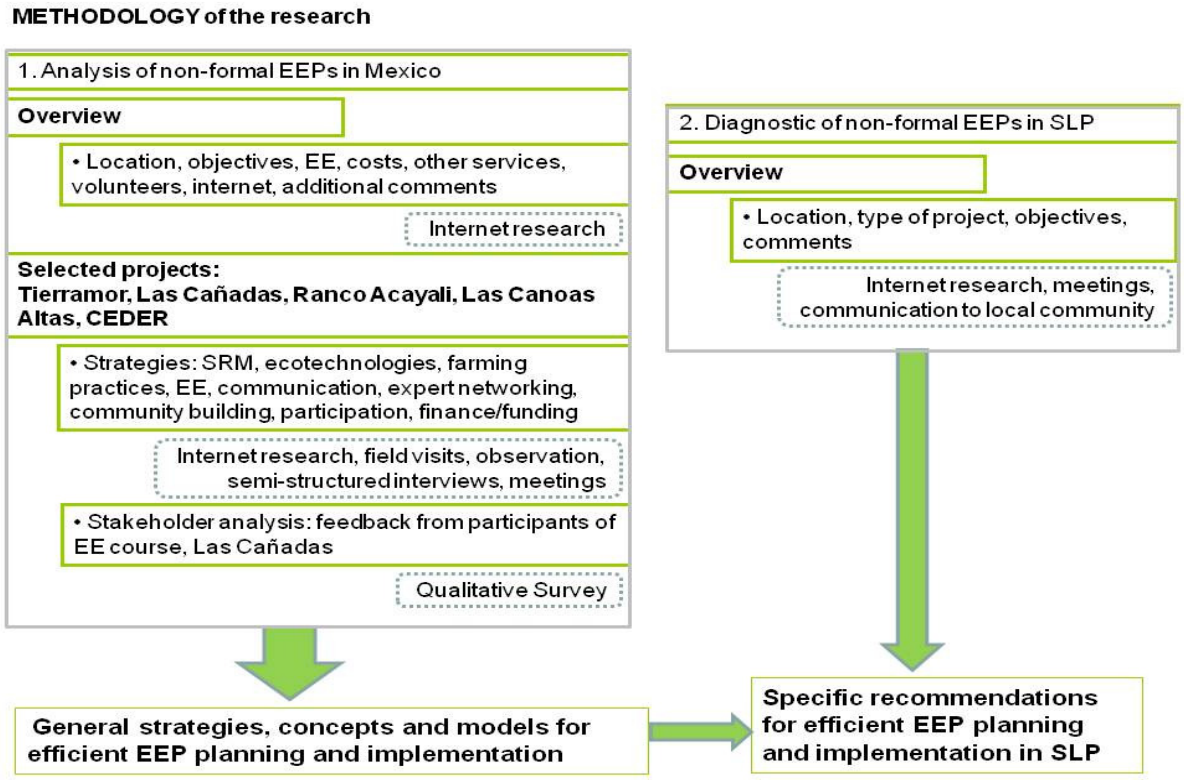


Figure 9: Research Methodology

[2] web applications that facilitate participatory information sharing, interoperability, user-centered design

3.2. EEPs in Mexico

The overview of EEPs in Mexico is based on extensive internet research and provides an overview of what kind of non-formal EEPs exist in Mexico. It provides an overview of projects in Mexico which promote sustainability, agroecology and permaculture, recommended by the website http://caminosostenible.org/.

- Actions: Internet research, structured non-participative observation.
- Outputs: Elaboration of table which provides an overview of current EEPs in Mexico, highlighting their location, objectives and courses.

Limitations:

The overview of sustainable EEPs in Mexico only offers a selection of existing initiatives and does not pretend to be complete as not all projects are to be found in the internet which was the primary source for the data generation. This also explains that investigated strategies do not include implemented infrastructure and installations as there is no information available on the internet regarding those topics; instead the focus is placed on strategies of EE and communication.

3.3. The five selected EEPs in Mexico

The selected projects were randomly chosen based on internet research for sustainable projects in Mexico. Communication strategy, web design and content were first criteria's for further investigating projects. Only Rancho Acayali and Las Canoas Altas were not "discovered" via the internet but were a recommendation from local people (even though information on these projects can be found in the internet).

- Actions: internet research, field visits, structured observations, semi-structured interviews.
- Outputs: overview of objectives, area and climate.

Limitations:

Due to time constraints only five projects were analyzed in detail.

Las Cañadas, Veracruz

The visit took place as a participant in the course "ecotechnologies and renewable energies", 21. - 26. March 2011. During the stay at the cooperative there was the opportunity to examine local

settings, talk to founders and the members of the project and experience life on the site. Own observation, field visits and didactic materials from the course helped to identify methodologies and strategies of the EEP. Additionally, a qualitative survey was conducted with 15 participants at the end of the course (see 3.3.2.).

RANCHO ACAYALI, VERACRUZ

After visiting Las Cañadas, in Huatusco, Veracruz, there was the opportunity of getting to know a recommended project of Paul Barber who also offers courses on vegetable gardens and making food preserves. During the two hour visit he explained his work and gave a tour of his ranch. A semi-structured interview was conducted. His worker was also present and contributed to the conversation.

TIERRAMOR, MICHOACÁN

Tierramor was visited twice. The first visit took place in August, 2010. During the two hour visit Holger Hieronomi provided a tour of his family farm (with Marina Ortiz) explaining infrastructure and design in detail. A semi-structured interview was conducted. The second visit took place as a participant in the course "Foundations of permaculture", 21. - 27. April 2011, exploring further strategies of EE, communication and organization.

LAS CANOAS ALTAS, MICHOACÁN

When visiting Tierramor in August, 2010, there was also the chance to spontaneously visit Las Canoas Altas, an integrated farm which focuses on volunteer management. During the two hour field visit a semi-structured interview was conducted with the owners, Martha E. Zapién Rosas and Vincent Geerts Rasquin.

CEDER, MEXICO

This project was visited in August, 2010. A semi-structured interview was conducted with the founder of the project, Margarita Barney Almeida. After meeting first in the office of Grupedsac in D.F. the demonstration site of CEDER was visited and objectives and missions of the project were discussed.

3.3.1. STRATEGIES OF SUSTAINABLE RESOURCE MANAGEMENT, ENVIRONMENTAL EDUCATION, COMMUNICATION, ORGANIZATION AND FINANCE

The investigated projects are compared using a complex indicator index. This indicator index takes into account forms of implemented sustainable resource management including applied farming practices and ecotechnologies, types and topics of EE and a social impact evaluation based on strategies of communication and promotion and investigates financial sustainability of the projects. This indicator index is linked with the evaluation model recently proposed by SEMARNAT (Viadas, 2011), taking into account strategies of administration, organization and financing, infrastructure, environmental teaching, sustainable resources management and socio-environmental solutions such as community building and participation. The case studies facilitate an analysis of the functioning of the non-formal EEPs and allow further recommendations.

- Actions: literature review, internet investigation, field visits, structured and non-structured observation, participative observation, semi-structured interviews, photos, video recording.
- Outputs: elaboration of table which highlights implemented strategies within the selected projects such as farming practices, ecotechnologies, EE Initiatives, organization and finance.

Limitations:

Information provided does not pretend to be complete; and it must be noted that some projects have been investigated during a one day field visit whereas two projects (Tierramor and Las Cañadas) were visited for 5 days during a workshop held at the site.

3.3.2. FEEDBACK FROM PARTICIPANTS, LAS CAÑADAS

A total of 15 participants, who took part in the course "ecotechnology and renewable energies" in Las Cañadas, filled out a qualitative survey at the end of a six day course which took place on 21. - 26. March, 2011. General statistical data was investigated such as name, age, profession and residency. Additionally, the survey was divided into two parts, a) expectations of a sustainable community project and b) evaluation of the workshop.

- Actions: qualitative survey.
- Outputs: analysis and interpretation of answers.

Limitations:

Referring to the qualitative survey conducted at Las Cañadas it is important to note that the questions were not completely answered by all the participants which results in gaps of information.

3.4. EEPs in San Luis Potosi

Information regarding current non-formal EEPs in SLP is limited. Initially the internet research did not provide any relevant publications. Only through talking to different stakeholders in SLP it was possible to gather information about existing EEPs.

- Actions: internet research, participative observation, interactive communication, semi-structured interviews.
- Outputs: overview of existing non-formal EE Projects in SLP.

Limitations:

The information provided is mainly based on communication and internet research and does not include all non-formal EEIs which can be currently found in SLP. Furthermore, it should be noted that EEPs in SLP are a rather recent development, thus available information is still scarce.

4. RESULTS AND DISCUSSION

The fourth chapter presents the results from the data conducted and compares the investigated projects in terms of their structure, strategies and methodologies. It highlights best practices and develops concepts which support the efficient planning and implementation of an EEP and outlines further recommendations. In addition, it analyses the application of those for the case study of San Luis Potosí, showing which future objectives should be focused on in order to increase the impact of existing EEIs or to efficiently plan new ones.

4.1. EEPS IN MEXICO

A general overview of some sustainable projects in Mexico is presented in table 6, identifying location, objectives and content of EE (see also appendix a for an additional overview on EEPs in Mexico focusing on permaculture). The table refers to the engagement of volunteers, internet profile and allows further reflection in the additional comments section.

4.1.1. ENVIRONMENTAL EDUCATION COURSES

In general, there are many similarities between the projects in terms of objectives and course offers. The focus is placed on sustainable RM, organic food production, permaculture and communitarian rural development. COAS and Gaia Sana, for example, offer courses in keyline design[3] and soil science[4]. Project San Isidro, Granja Tequio and Huerto del Ts'unu'un have widened their scope and offer courses especially interesting for participants living in urban settings such as roof top terraces, urban vegetable gardens and vegetarian cooking. Elaboration of biodegradable products seems an essential addition within the scope of courses (Huerto del Ts'unu'un). Apart from workshops other services are offered such as guided visits, consulting, working with communities and schools.

The duration of courses vary from one day up to 7 days. The costs of courses are similar, for example, one day 700 pesos (Granja Tequio) or seven days for 5000 pesos (Proyecto San Isidro),

[3] Technique for the optimization of (rain) water use within land use and management systems taking into account topography and geography, see Yeomans (1954)

[4] identifying the components such as nutrients or pesticides of the soil

additionally including food and accommodation. In this context is important to note that some projects offer discounts for teachers, students and rural organizations (COAS); scholarships and group discounts (Huerto del Ts'unu'un). Gaia Sana offers practical short term workshops of building ecotechnologies, exchanging labor and capacity building. This requires physical work of the participants but at the same time it enables practical knowledge and integration of the participants in the development of sustainable infrastructure.

4.1.2. COMMUNICATION AND ORGANIZATION

Effective communication strategies are fundamental for the success of EEPs. All of the projects offer information about their objectives, their mission and values on their websites. Additionally, Huerto del Ts'unu'un and Proyecto San Isidro, offer some interesting links referring to sustainable development, permaculture and agroecology. In this way, websites offer further information and show interlinkages with other initiatives and organizations.

Volunteer engagement is facilitated by some, yet their approaches within volunteer management are quite different. Huerto del Ts'unu'un, for example, asks for a food contribution of 250 pesos per week and expects the volunteers to work between four and six hours a day, with a minimum stay of one week - this is short term commitment, with relatively low costs and labor input. Proyecto San Isidro offers two programs to become involved: the first one is to work in the local school six hours per day with a minimum stay of six months. The other one, the so called apprentice program, is quite pricy (15.000 pesos per month) but includes accommodation and three hours per day of teaching and practice. In this context it should be mentioned that Project San Isidro is run by Alejandra Caballero C., an expert who has published books on sustainable architecture and bioconstructions[5].

[5] Caballero, A. and Montes, J. (1997).Agrícultura sostenible, un acercamiento a la permacultura, SEMARNAT and CECADESU, Mexico; Caballero, A. (2006) Bioconstrucciones; somos lo que habitamos in *Ecohabitat. Experiencias rumbo a la sustentabilidad*. SEMARNAT, Mexico

Table 6: Overview of EEPs in Mexico

PROJECTS IN MEXICO – PERMACULTURE, AGROECOLOGY AND SUSTAINABILITY[6]							
EEP and location	**Objectives**	**Courses**	**Costs in pesos[7]**	**Other services**	**Volunteers**	**Internet**	**Additional comments**
COAS, Hidalgo	RM[8], OA[9],, investigation, sustainable communitarian rural development	keyline design[10], OA[11], permaculture[12], microbiology, soil science[13], sustainable livestock	e.g. Keyline & program map, 2 days, 3000	Capacity building, agro ecologic diagnostic, consulting, conferences, investigation	No data	Info about organizati on	International courses in Peru, Honduras – large network with other organizations, discounts for students, teachers & rural organizations
Gaia Sana, Hidalgo	Permaculture, OA, communitarian and rural development, assistance with EE[14]projects	OA, introduction to permaculture, Keyline design, chromatography	No data	Technical assistance, project formulation & evaluation, resources management	No data	Info about organizati on	Organic food basket, practical workshop of ecotechnologies: exchange of work and knowledge (no cost)
Granja, Tequio Puebla	Demonstration site: permaculture, ecological events	Urban vegetable garden, compost, bioconstruction, aromatic plants	one day, 8 hours: 700	Organic seed sale, visits: 2 hours for 70/50 pesos	No data	Info about organizati on	
Permacul turarte – Huerto del Ts'unu'u n, Morelos	Demonstration site, permaculture	Permaculture, OA &, herbal & medical plants, vegetarian cooking, elaboration of biodegradable products	Affordabl e courses (3 days for around 1600)	EE in schools & communities, sale of products	250 pesos/ week, minimum stay one week, 4-6 hours of work/day	Info about organizati on, links to other projects & sites of interest	Discount system: exchange of work & capacity building, group discount, 50% discount for economically underprivileged
Proyecto San Isidro Mexico	Permaculture, bioconstructions, camps, ecotourism, EA for environmental educators, sustainable living	Natural rooftops, vegetarian food & cooking, permaculture, soil regeneration, forest regeneration, boveda nubiana, earth (adobe) construction, bioconstruction	Courses around 5000 pesos, one week	Consulting, visits: 3 hours for 130, 5 hours for 250,	a)school: minimum stay 6 months, b)apprentice program: 1500 US$ per month with 3 hrs/day of teaching	Links to other projects & sites of interest	Project by Alejandra Caballero C. / Francisco Gómez R.[15]
Rancho El Chuzo Coahuila	Permaculture, ecotourism, handcrafted products	Organic food production, production of natural food preserves	No data	sale of natural food preserves	Minimum stay 2 weeks	Last updated 2008	Due to the lack of website update it is not clear whether the project and its forms of EE continues to exist

[6] For more sustainable projects in Mexico promoting EE see appendix a; the projects CEDER, Las Canoas Altas, Las Cañadas, Rancho Acayali and Tierramor are not represented here as their specific analysis follows in the next section
[7] At the time of research the exchange course for pesos was approximately: 1 Euro = 17 pesos, 1 US$=11.9 pesos
[8] Resource management
[9] Organic agriculture
[10] Technique for the optimization of (rain) water use within land use and management systems taking into account topography and geography, see Yeomans (1954)
[11] Organic agriculture
[12] Permaculture usually includes topics such as bioconstruction, ecotechnologies and organic agriculture (see 2.4.)
[13] Identifying the components such as nutrients or pesticides of the soil
[14] Environmental education
[15] Alejandra Caballero C. has published books on sustainable architecture and bioconstructions

4.2. THE FIVE SELECTED EEPS IN MEXICO

Grupedsac, a civil association based in the city of Mexico, has two demonstration centers, one in the federal state of Mexico (CEDER, 0,3 hectares) and the other one in Oaxaca (ITT, 10 hectares), which claims to be the first permaculture centre in the state of Oaxaca. Both centers aim to involve the local communities and people interested in sustainable development. For this analysis CEDER has been investigated.

Tierramor, a family farm project, was bought in 2002 and started transforming the land (2500m²) and implementing the permaculture project since 2003.

Las Cañadas has used its land (over 300 hectares) differently over time; from 1988-95 as livestock farm (with drastic erosion problems), from 1996-2007 as area of ecotourism (with limited sustainable impact) and from 1999-2007 for organic cheese production for the local market. Since 2006 it is a cooperative with the objectives of sustainable living, auto sufficiency in food production and the implementation of permaculture principles. This transformation is based on a personal encounter with David Holmgren in 2007.

Las Canoas Altas is a private sustainable initiative which constructed its house based on principles of bioconstruction and biodynamic in 2004. In contrary to other investigated projects this initiative focuses on volunteer management and participation and is part of WWOOF Mexico.

Rancho Acayali is highly recommended by Las Cañadas (see webpage) and local inhabitants of Jalapa, Veracruz. It is a private initiative focusing on organic agriculture, selling its products on a local market and offering practical workshops (horticulture and natural food preservation).

Table 7 provides an overview of the selected projects, highlighting their location, climate, area size and objectives. Two of the projects are located in the federal state of Michoacán, two in Veracruz and the other one in Mexico. All of the projects are long-term initiatives which have evolved and developed over time. The area of Las Cañadas is notably larger (300 hectares in comparison to less than half and up to two hectares of the other projects), which allows more experimentation with organic livestock and ecotechnologies such as water pumps due to access to

river. Also, the rainfall per annum is considerably higher in the state of Veracruz, which facilitates a higher quantity of rainwater catchment and sustainable wood production. The objectives of the projects are similar and focus on self-sufficient food production, sustainable way of living, resources management, promoting agrobiodiversity and educational services. Las Canoas furthermore concentrates on volunteer management, promoting an active exchange of work and capacity building. The table emphasizes that all projects investigated reflect the concept and ideas of permaculture, with the exception of Las Canoas Altas which refers more to the Rudolf Steiner & Waldorf Pedagogy[16] (even though it represents one of the permaculture strategies in terms of education). This is worth noting, as this was not an initial criteria for this investigation. Also interesting, as mentioned above, in the case of Las Cañadas it was an evolutionary process to apply the permaculture concept as management strategy (since 2006/2007).

Table 7: Overview of selected investigated EEPs

	Tierramor	Las Cañadas	Rancho Acayali	Las Canoas Altas	CEDER
Type of project	**Permaculture concept**	**Permaculture concept**	**Permaculture concept**	**Rudolf Steiner & Waldorf Pedagogy**	**Permaculture concept**
	Family farm	Cooperative	Private	Private	Civil association
Integrated farming systems					
Founded in	Initiative founded in 1999, land was bought in 2002, since 2003 working with the land	Since 1996 but using the permaculture concept since 2007	Since 2001	Land was bought in 2001, house constructed in 2004	Since 1990
Location	Erongaricuaro, Michoacán	Huatusco, Veracruz	Xico, Veracruz	Erongaricuaro, Michoacán	Huixquilucan, Mexico
Climate	Mild-temperate /subtropical, 850 mm/year	Subtropical, 2000mm/year	Subtropical; 2000mm/year	Mild-temperate /subtropical, 850 mm/year	Semi-warm, 900mm/year
Area in m²	2500	3.060000	12.500	25.000	3000
Objectives	Food production, improving the soil, integrated system, place for exchange, promoting different ecosystems and agrobiodiversity	Sustainable way of living & resources management, self-sufficient food production, agrobiodiversity	Sustainable way of living, self-sufficient food production and organic food production for local market	Living and demonstration site; transform the farm with the participation of volunteers - exchange of work and knowledge; to give an impulse towards sustainability	Trainings & demonstration centre; mission: to reproduce and not to monopolize

[16] Humanistic, interdisciplinary, integrated, practical and artistic learning based on the education philosophy of Rudolf Steiner

4.2.1. STRATEGIES OF SUSTAINABLE RESOURCE MANAGEMENT AND ECOTECHNOLOGIES

An EEP must consider site specific conditions such as climate and size and use available resources wisely. Some simple, creative initiatives such as local resource management and site-specific observations promote environmental awareness and sustainable consumption – without great cost and only by rethinking the way resources are used (see table 8 and Figure 10). It is especially those small things which should be promoted by an EEP as those solution approaches can easily be duplicated by most of the participants.

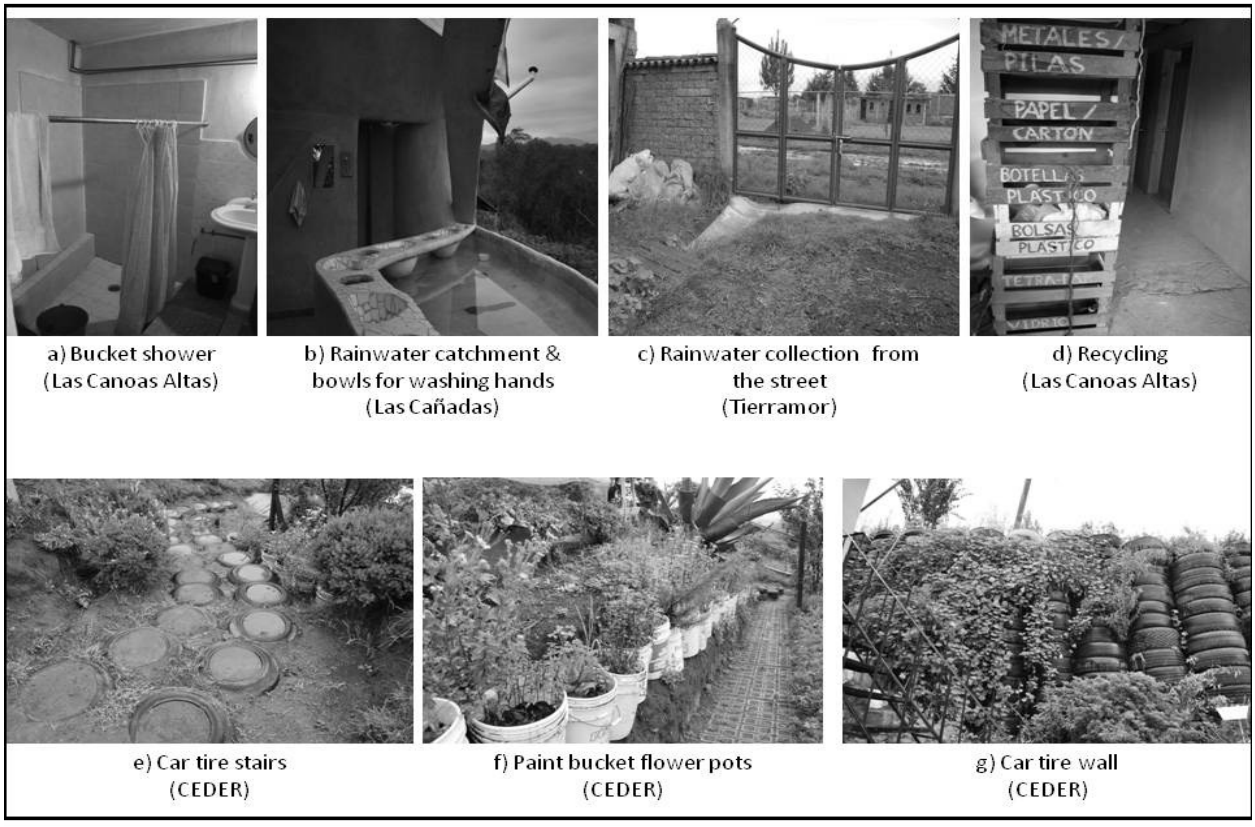


Figure 10: Sustainable resource management_Simple initiatives

All the projects promote bioconstructions (see Figure 11 and

Figure 12) which is based on mainly natural materials and recycled materials such as glass bottles. CEDER shows in an interesting way which different bioconstruction techniques exist

(see figure 12 d) by displaying the different materials used for construction such as rammed earth/cement stabilization, straw bale and sand bags with the help of a glass wall.

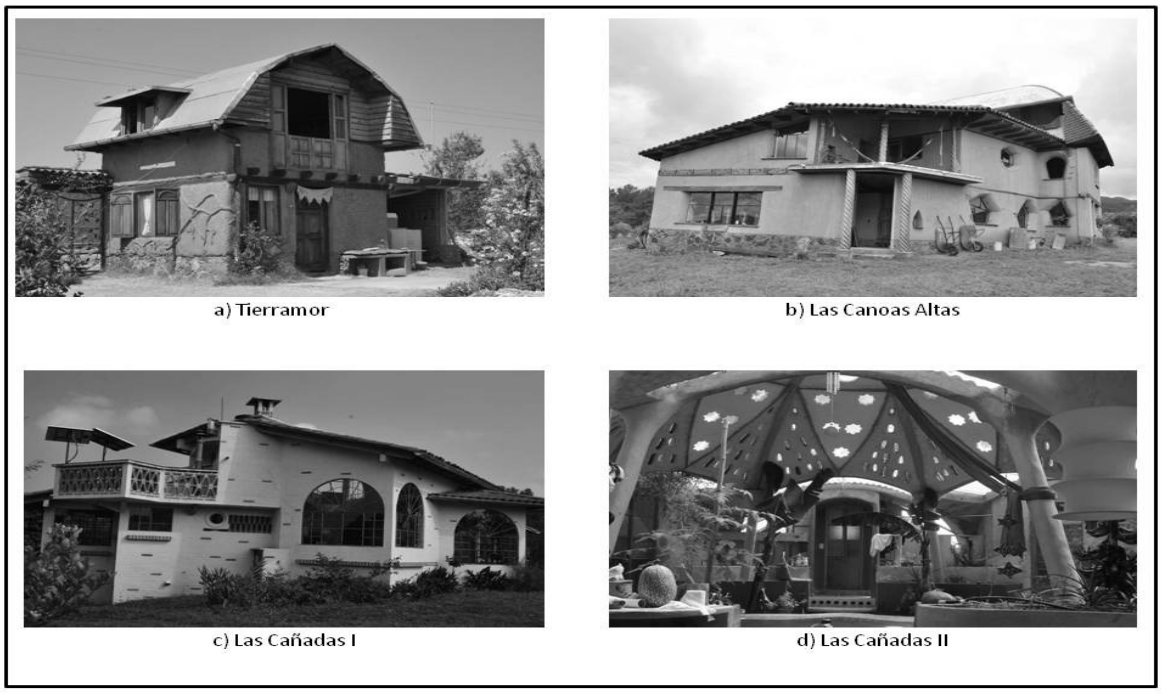


Figure 11: Bioconstructions I

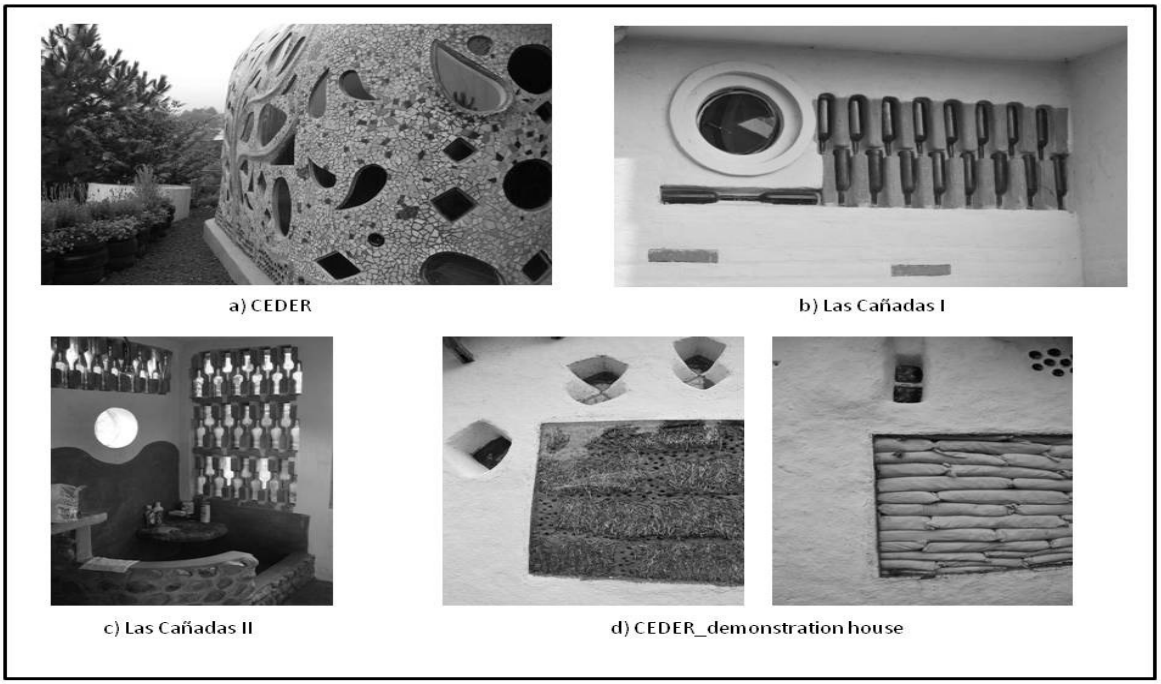


Figure 12: Bioconstructions II

In terms of water catchment, saving and recycling initiatives all selected projects collect rainwater, store it in Ferrocement tanks[17] (see Figure 13) and use the water mostly for irrigation. Las Cañadas has installed at least four Ferrocement tanks, each with a capacity of 46,000 liters and Tierramor has three tanks with a capacity over 60,000 liters. Taking into account the relatively easy and economical construction of Ferrocement tanks it is a highly recommended strategy of reducing conventional water consumption and increasing water supply. Las Cañadas promotes a sediment filtration system for the collected rainwater (see figure 13 d) so that the water can be used for washing up or for the shower. A slightly more complex filtration system is used by Tierramor which cleans the rainwater in order to obtain drinking water (see figure 13 c).

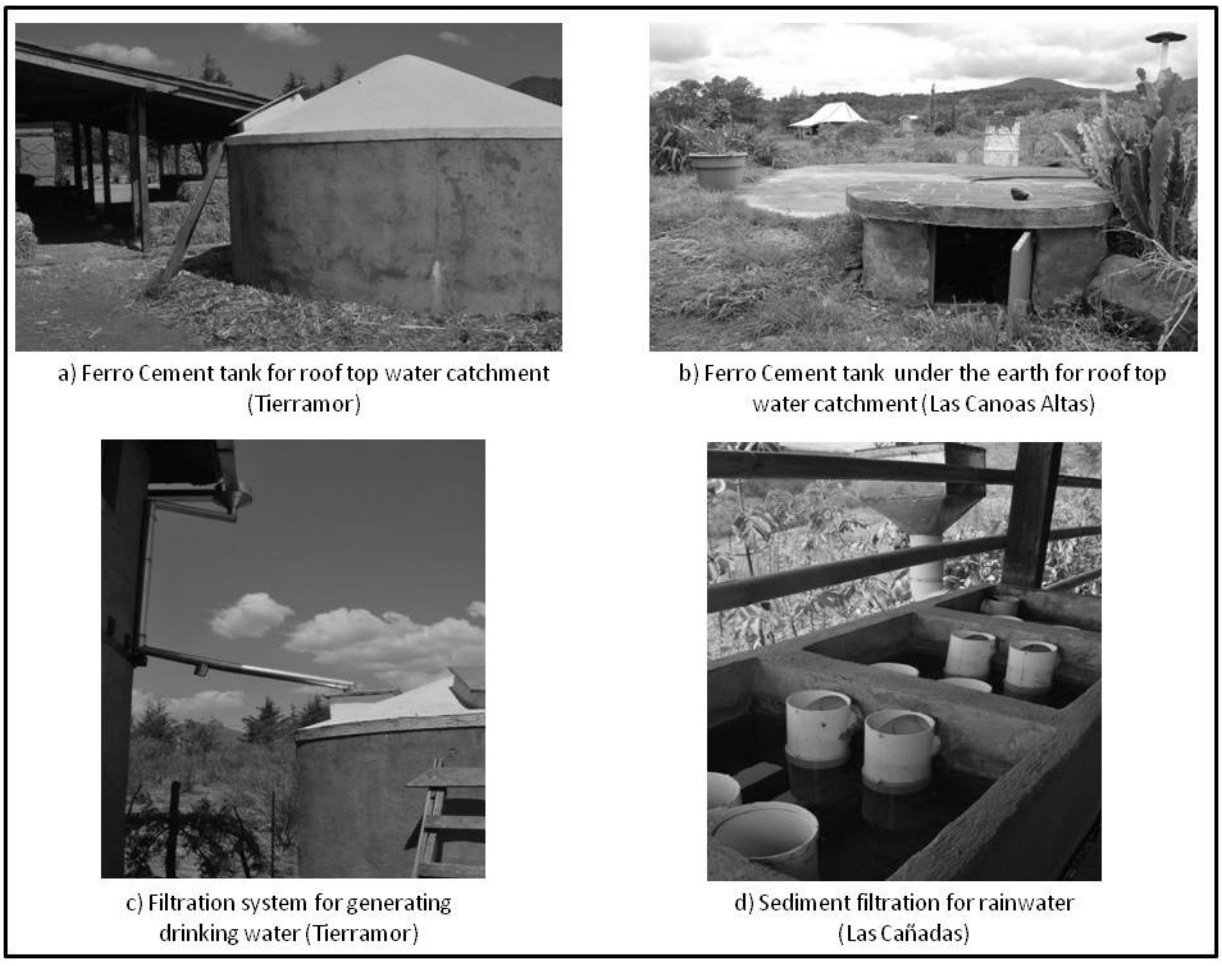
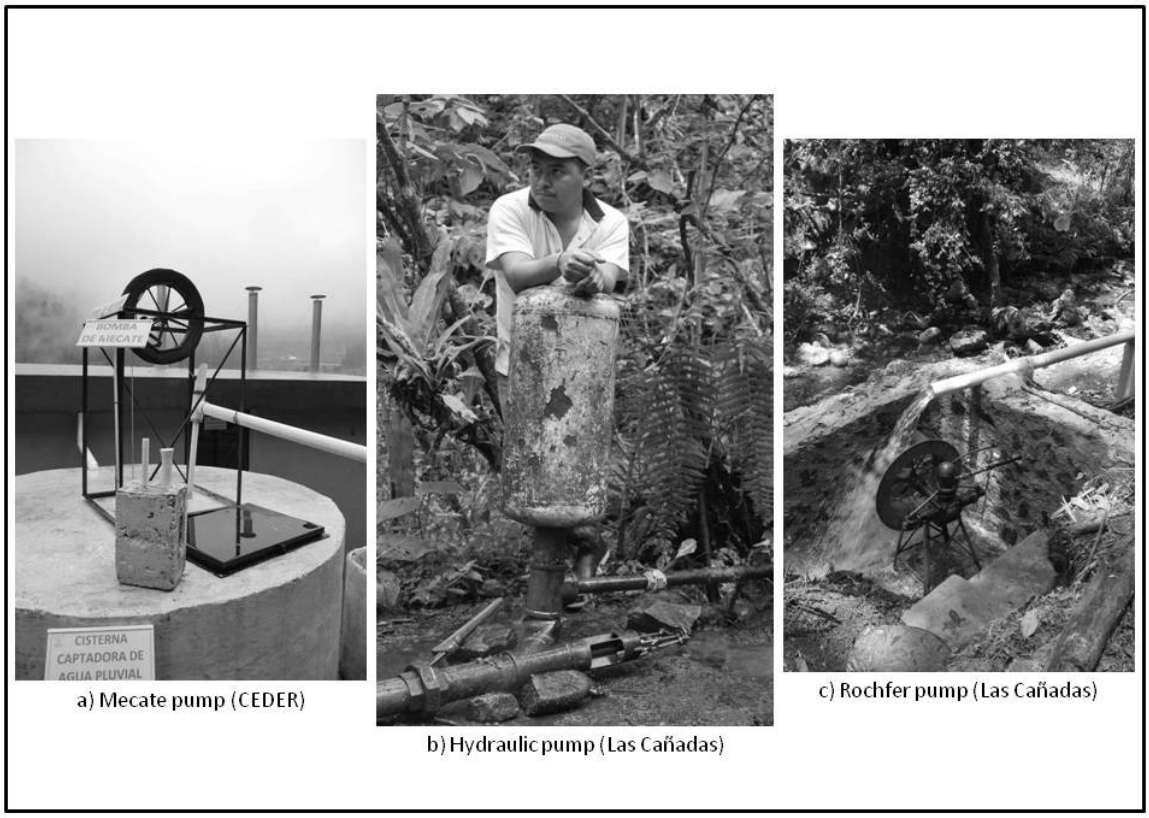


Figure 13: Rainwater collecting and cleaning

[17] Water and storage tanks are built with a cement-rich mortar reinforced with wires (see Watt, 1978)

Recommended water pumps are the solar pumps, a system which works with the 12 Volts generated by the solar panels but which functions only during the day when there is sun; and the Rochfer and hydraulic pump (see figure 14 b and c). An alternative to the solar bomb, for example is the Mecate bomb (Las Cañadas and CEDER, see figure 14) which is operated manually and does not require energy but its construction and installation needs technical assistance.



a) Mecate pump (CEDER)

b) Hydraulic pump (Las Cañadas)

c) Rochfer pump (Las Cañadas)

Figure 14: Water pumps

Gray water[18] recycling is easy, efficient and with little costs involved and is applied by all five projects. Gray water can be filtered with a grease trap in order to apply it for irrigation or recycle it back to the soil and ground water. Las Cañadas use several tanks with aquatic plants (figure 15) for cleaning its gray water from the showers (aerobic process). Tierramor uses a system of

[18] Gray water refers to waste water which is generated by laundry, bathing and dishwashing (see Art, 2006)

branched drainage (see Art, 2006) to water its fruit trees as those absorb gray water better than for example vegetables.

Figure 15: Gray water recycling, Las Cañadas

Dry toilets (see figure 15) are highly recommended and a variety of designs make them increasingly popular even within the urban context and should be part of any EEP in order to promote the recycling of human waste, the production of organic fertilizer and the reduction of water consumption; especially within Mexico where water supply is an increasing challenge and waste drainage is a major factor for environmental pollution. Dry toilets do not need water, do not produce black waters[19], reduce water consumption and produce valuable compost and organic fertilizer. They are installed in all of the projects except CEDER which uses a biodigestor[20] instead.

A biodigestor is not recommended for all projects as its installation requires technical assistance and does not necessarily reduce water consumption for toilet use. Las Cañadas used to have a biodigestor until 2009 but now simply prefer to use dry toilets, based on the fact that the

[19] Black water refers to sewage and water contaminated with human waste (Jenkins, 2005)

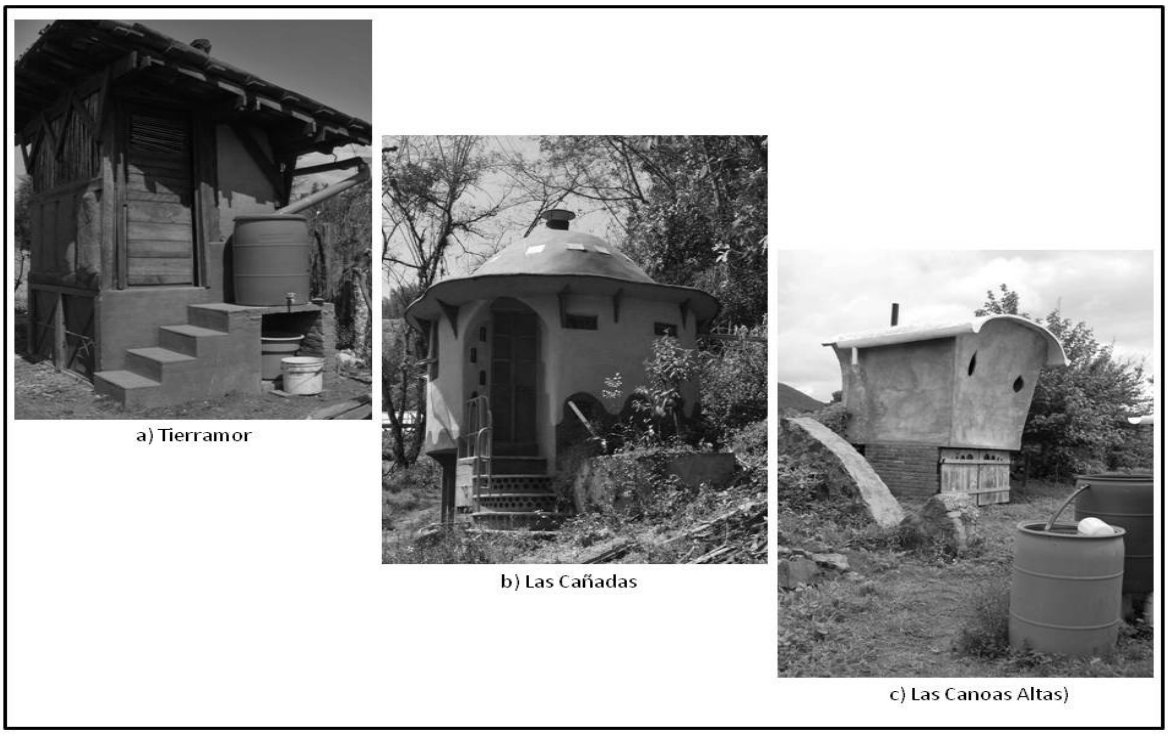
[20] A biodigestor recycles gray and black water under anaerobic processes using microorganisms to break down food and organic waste and is also used for biogas production (Botero and Preston, 1987)

production of biogas was not very successful and that the use of a biodigestor does not reduce water consumption. They do not recommend a biodigestor within a small-scale project or communities with little access to resources. Tierramor also uses a biodigestor but applies the Oasis Design (see Art, 2006) which channels the water further into a duck pond. Once a week the pond is cleaned and the highly nutritious and fertilized water is collected manually and used for compost production. This so called Oasis Design is an incredible creative and efficient way of recycling and upcycling water and reflects many permaculture ethic and design principles, for example "the field of a system is theoretically unlimited" (Mollison, 1988, see appendix b).

Solar panels, another way of using renewable energy, are installed at Tierramor, Las Cañadas and Rancho Acayali (no data on Las Canoas Altas or CEDER). The initial cost of installing solar cells is relatively high for good equipment, and as mentioned before, their efficiency in terms of net energy or EROI is often criticized (see 2.2.). Tierramor highlights the high reparation costs and prefers more sustainable energy consumption. Nevertheless, 90% of its energy consumed is produced by solar energy.

Other promoted ecotechnologies (see figure 17) include the highly efficient dehydrator for drying fruits and vegetables, the energy bicycle and the easy-to-build and economical wood-saving ovens and stoves.

Thus, ecotechnologies such as dry toilets, biodigestors, water tanks, rainwater filters and solar panels support sustainable resource management; nevertheless, their implementation is dependent on initial money investment and on size of the project. Especially solar panels are costly and, taking into account their net energy, are not as energy-saving as often promoted. Therefore, EEPs should first analyze what strategies can be implemented at no or very little cost and then, which ecotechnologies might be most beneficial for their specific case.

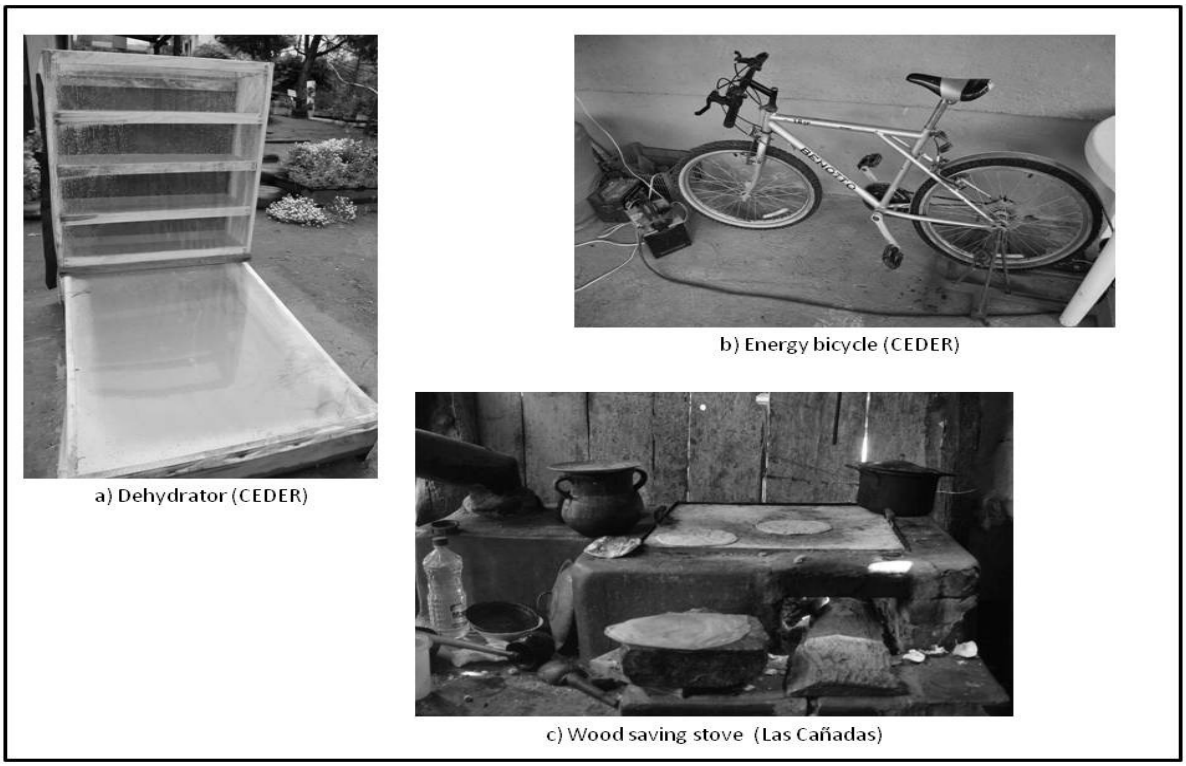


a) Tierramor

b) Las Cañadas

c) Las Canoas Altas)

Figure 16:: Dry toilet designs



a) Dehydrator (CEDER)

b) Energy bicycle (CEDER)

c) Wood saving stove (Las Cañadas)

Figure 17: Sustainable resource management_Ecotechnologies

Table 8: Strategies_Resource management & ecotechnologies

	Tierramor	Las Cañadas	Rancho Acayali	Las Canoas Altas	CEDER
RESOURCE MANAGEMENT & ECOTECHNOLOGIES					
Simple initiatives	No car, water collecting from the street, north - south calculations	Only one electricity connector for visitors, at night mostly solar illumination		Only light at night, rocks from the area are used for construction	Upcycling (car tires for wall and stairs, paint buckets for flower pots)
	Water gravity calculations	Bowls for washing hands & brushing teeth		Bucket showers, no hot water	
Bio construction	Adobe building, glass bottles	In construction: bamboo house	Adobe building	Adobe construction	"Demonstration of different techniques
Installations		Wood saving stoves/oven			Wood saving stoves/oven
		Dehydrator for beans			Dehydrator, Energy bicycle
WATER CATCHMENT, SAVING & RECYCLING					
Rainwater catchment	Roof top water catchment for drinking water	Roof top water catchment with sediment filtration	Roof top water catchment	Tank underneath the earth for rain water collection	Tank underneath the earth, catching water from the roof
	3 Ferrocement tanks_ 30.150 lts, 21.800 lts, and 12.750 lts	At least 4 Ferrocement tanks with each a capacity of 46,000 liters			"Outside" tank for direct rain water catchment
Dry toilet	Yes	Yes	Yes	Yes	No
Gray waters	Branched drainage[21] washing machine - 9 trees; shower - 4 trees	several tanks with aquatic plants, recycling water from shower	Water is channeled, using a filter, to the soil	Grease trap	Grease trap
Black waters	Biodigestor & pond OASIS DESIGN[22]	Used to have biodigestor but prefer simply compost toilet			Biodigestor
WATER PUMPING					
Solar pump[23]	No data	3 panels with 75 watts each one: 9,000 liters/day, up to 25 m high - expensive equipment; one solar panel with 60 watts, up to 5 meters high, 2,500 pesos	No data	No data	No data
Other pumps	No	Rochfer, Mecate, Hydraulic pump	No	No	Mecate
Water heating	Solar	Wood & solar	No data	No data	No
ENERGY					
Solar panels	Rather critical of photovoltaic energy but 90% solar energy, panels on the roof	12 modules with 53 watts each, total output of around 2,400 watts per day; investor of 1,500 watts	2 panels with each 50 Watts, investor & controller, 14,000 peso; 4 panels a 15 watts, investor and controller, 5000 pesos	No data	No data

[21] water is channeled through tubes under the earth
[22] small wetland & ducks clean water , which is then used for irrigation
[23] systems work with the 12 volts generated by the solar panels without batteries but only work if there is sun

4.2.2. STRATEGIES OF FARMING PRACTICES

Farming practice strategies have been similar within the analyzed projects (see table 9 and figure 18). The focus is placed on organic agriculture/horticulture, composting, sustainable resource and water management and promoting agrobiodiversity by incorporating a high variety of crops, herbal and medical plants, fruit trees, leguminous plants, editable flowers and a variety of crops. Also wood production is recommended when managed on a sustainable scale (Las Cañadas).
Additionally, Las Canoas Altas practices apiculture (beekeeping) and Las Cañadas focus on sustainable cattle farming and local dairy production. In this way organically products are elaborated, which are either sold to the local community, visitors or are self-consumed. Green houses provide food outside the season and organic seed production guarantees seeds for the coming year and some additional income from seed sale. Other recommended sustainable resource management strategies include live stock (especially chickens), traditional irrigation system and biological pest control.

Figure 18: Farming practices

The integration of chickens within farming practices is quite popular and is applied by all the projects but Rancho Acayali) as they do not only produce eggs – Las Cañadas obtains around 60 eggs per day with 40 chickens and four roosters – but also fertilize the soil (see figure 18). Tierramor uses a rotating system of vegetable gardens and chicken area, thus changing their location every four months. In this way the chickens work the earth and fertilize the soil which is then used for horticulture.

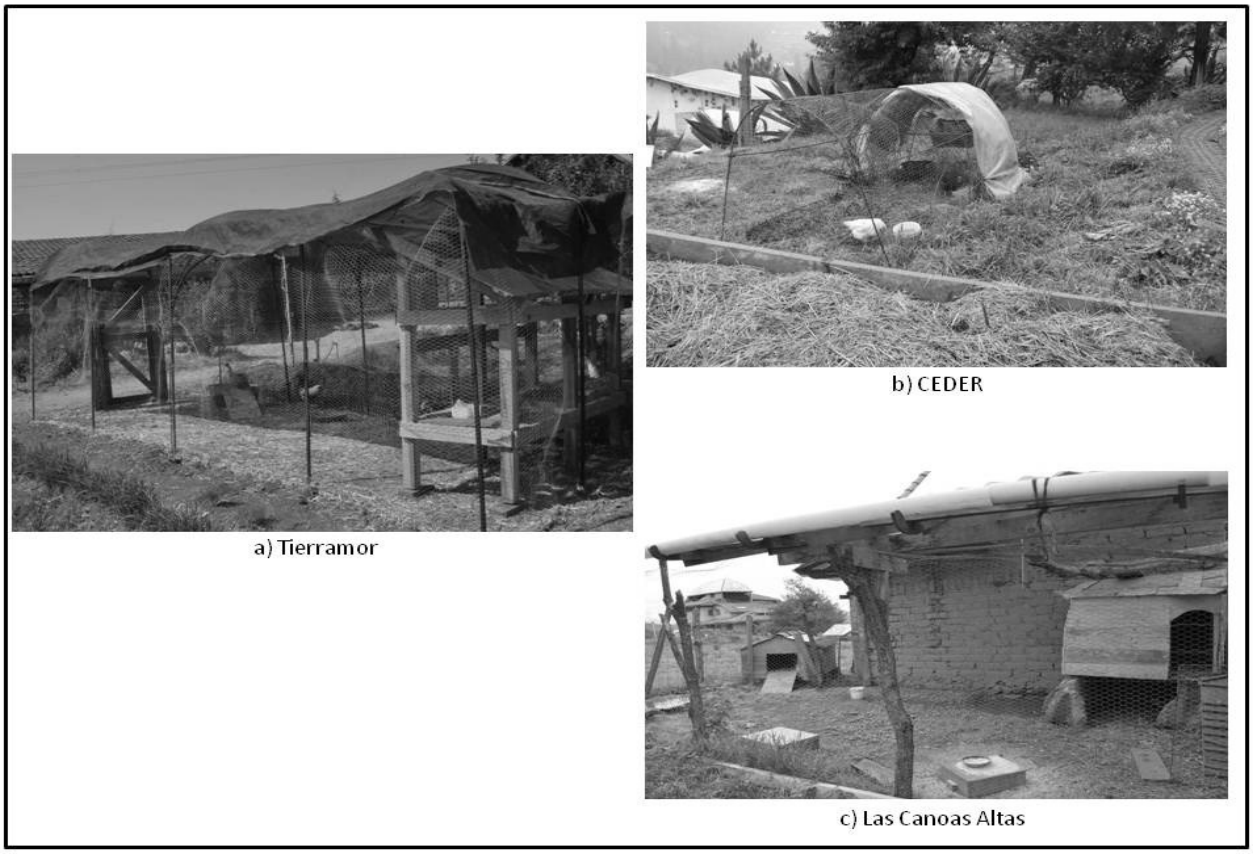


Figure 19: Chicken area

Traditional irrigation systems, such as trenches, channels, terraces and stone barriers are used by Tierramor, Las Cañadas and Rancho Acayali. Tierramor and Las Cañadas recommend the keyline design, an established concept for the planning and development process of agricultural land use by using rainwater in the most efficient way. Drip irrigation[24] systems are used by Las Canoas Altas and CEDER (see figure 20). Nevertheless, Rancho Acayali and Tierramor highlight

[24] Water saving technique for irrigation

the high investment of energy for setting up such system. Additionally, Tierramor recommends manual irrigation as this also implies observation, applying permaculture principle number one: Observe and Interact (Holmgren, 2002).

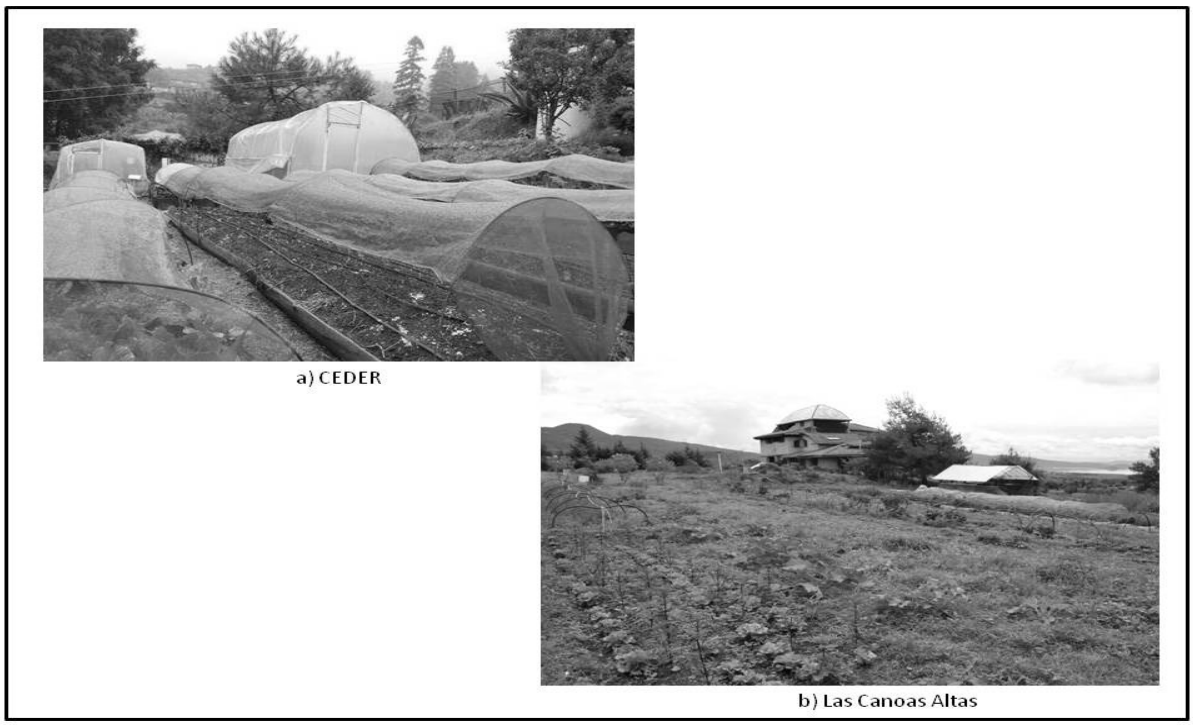


Figure 20: Drip irrigation

Tierramore also uses non-native plants such as Fagopyrum as long as they do not disturb the ecosystem and adapt well in the site-specific area. Rancho Acayali notes that some native abundant plants are often rejected by the local population and considered as weeds, even though they are delicious and nutritious.

Biological pest control forms part of organic agriculture. Rancho Acayali has created a separated area of flowers in order to distract the Pieris sp. from the main crops and Tierramor uses its ducks in the rainy season against plaques such as snails and grasshoppers.

Table 9: Strategies _Farming practices

	Tierramor	Las Cañadas	Rancho Acayali	Las Canoas Altas	CEDER
FARMING PRACTICES					
Composting, organic horticulture, herbal & medical plants, agrobiodiversity, seed bank and green house					
Agroforestry	Fruit trees, leguminous plants	Fruit trees, leguminous plants, sustainable wood production	Fruit trees, leguminous plants	Fruit trees, leguminous plants	Fruit trees
Sustainable live stock	Chickens, rabbits, ducks	Chickens, cows	Donkey, pig	Chickens, horse	Chickens
Irrigation system	Trenches, irrigation channels	Trenches, irrigation channels, terraces	Irrigation channels	Drip irrigation	Drip irrigation
Additional comments	Non-native plants such as buckwheat	40 chickens and 4 roosters = 60 eggs per day	Native plants which are considered as weed by local farmers		
	Spiral: 15 species of herbal plants	Stone barriers to avoid erosion	Around 50 different crops		
	biological pest control		Biological pest control		
	Rotation of chicken and horticulture every 4 months				

4.2.3. STRATEGIES OF ENVIRONMENTAL EDUCATION

EE is offered by all of the five projects and table 11 provides an overview of applied strategies in terms of topics, costs, participation and integrated learning. It must be noted that Rancho Acayali and Las Canoas Altas focus less on EE courses in comparison with the other three projects.

4.2.3.1. Topics and costs

Regarding the course topics there exist a certain similarity. The focus is placed on organic agriculture and (bio-intensive) horticulture, permaculture, ecotechnologies, bioconstruction, communitarian development, agroecology and biodiversity. Table 10 provides an overview of all courses offered by CEDER as its variety of workshop topics is quite broad and offers a good overview of EE courses.

Table 10: EE topics according to CEDER

Topic of food	**Topic housing**
Bio-intensive and organic crop production	Auto construction with compacted earth
Urban agriculture	Straw bale construction
Organoponia	Construction with bamboo
Green rooftops	Sandbag construction
Restoration of the soils	Earth building (cob)
Herbal plants	Upcyclinb re-imagining our waste
Chicken/rabbits	Natural and waterproof painting
Compost	Ferro cement
Solar kitchen	Introduction to bioconstruction
Dehydrator for fruits and herbs	Human sustainable settlements
Smoking meat	Rain & recycled water capture system
Food processing	**Topic energy**:
Elaboration of handmade bread	Solar dehydrator
Elaboration of handmade beer	Solar water heating
Topic water	Solar oven
Roof rain water catchment	Solar stove
Water runoff catchment towards holes in the earth	Energy-saving stoves & ovens with wood
Water catchment through irrigation channel and curve levels	Meat smoker
Rain water tank construction with Ferro cement	Bicycles generating electric energies
Dry sanitation, rain water catchment for showers	Vermicomposting
Drop irrigation	Biodigestor
Treatment of gray and black waters	Hybrid wind turbine (solar and wind)
Wetlands	
Forestry	
Topic communitarian sustainable development	
Workshops with proposal elaboration	
Elaboration/application of communitarian diagnostic	
Elaboration of impact indicators	
Communitarian and sustainable tourism	

Rancho Acayali and Las Canoas Altas promote processing food with producing natural food preserves and Las Canoas Altas teaches its volunteers of how to make bread, honey and yogurt. Las Cañadas offers courses on dairy production such as cheese and on healthy, vegetarian cooking. Also, the herbal and medical plants workshop by Tierramor explains further how certain plants can be used and processed, elaborating tees, oils and biodegradable products such as soaps and shampoos. Those workshops explore the possibilities of getting the most out of the organic gardening/agricultural products and might be particularly interesting for "city" participants as their implementation/duplication can be easily achieved also within urban settings and do not require land or large scale projects. The same applies for the Organoponia[25]course offered by CEDER, which is a great organic alternative to hydroponic and is especially interesting for creating roof top terraces within city structures. The EEPs have extended their course offers over

[25] Organioponia: similar to hydroponia, thus working with less soil but using organic liquid fertilizer

time, responding to the interests of participants and incorporating new knowledge and research, thus seeking process instead of set environmental agenda as recommended by Muñoz (2002).
Therefore, emphasis is placed on theoretical-practical workshops, implementing the learning-by-doing pedagogy as recommend by the objectives of ESD (see Wals, 2009). The consistency within the content of EE and other services provides a good indication for the development of course topics and other learning activities such as guided visits, conferences and working with local communities. The cost for a course is similar: 3 days for around 2000 pesos (CEDER) or5-6 days for around 5000 pesos (Tierramor and Las Cañadas) and usually includes accommodation, food, didactic materials and a certificate.

4.2.3.2. Participation, holistic learning and community building

A variety of didactic methodologies support active participation integrated learning, spirituality, community building and promotes ethical values such as respect, solidarity and tolerance. Forms of holistic learning are reflected in interactive projects, dances, movement, yoga and music sessions (Tierramor and Las Cañadas); and artistic workshops such as painting and color analysis (Las Canoas Altas). Las Cañadas, Rancho Acayali and CEDER also offer temazcales[26], seeking the union of participants in a circle, showing respect towards nature and exploring spirituality. The spirituality approach within EE is relatively new (but constitutes one of the seven permaculture flower petals) and encourages participants to reflect about cultural diversity, traditions and non-material values. Sessions such as the art of listening[27] further support community building within the group of participants from the EE course (see also Bogardi, 2009).
A diversification of didactical methodologies were applied by Tierramor and Las Cañadas by focusing on practical workshops, academic sessions, visits to local communities, documentaries, group dynamics and incorporating the participant's experiences (see figures 21 -23) Dances and games such as the art of listening (Tierramor) and camp fires with music and artistic performances (Las Cañadas) also supported community building within the group of participants.

[26] Traditional ritual steam bath
[27] Exercise of working in pairs after some controversial discourse/discussion (such as the topic of energy descent or natural catastrophes and their impact), listening to the other for about 10 min without interruption or comments)

Figure 21: EE_Didactic methodologies and integrated learning I

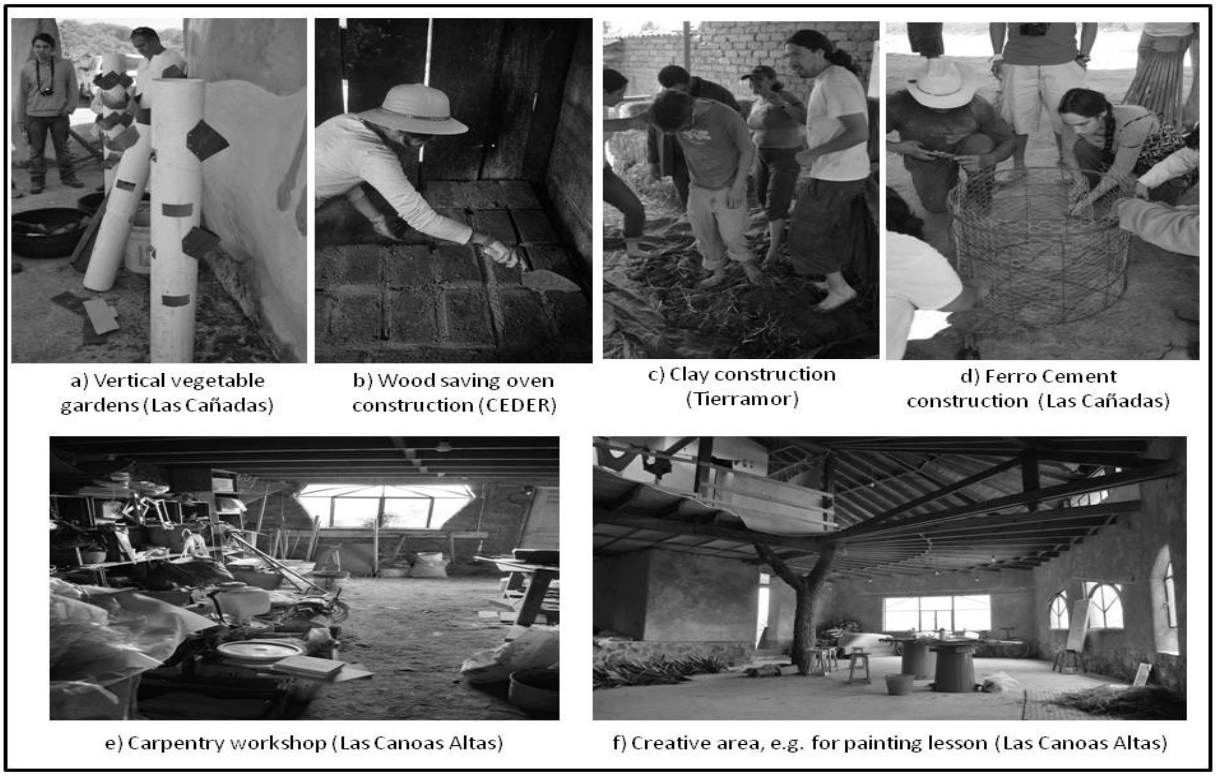


Figure 22: EE_Didactic methodologies and integrated learning II

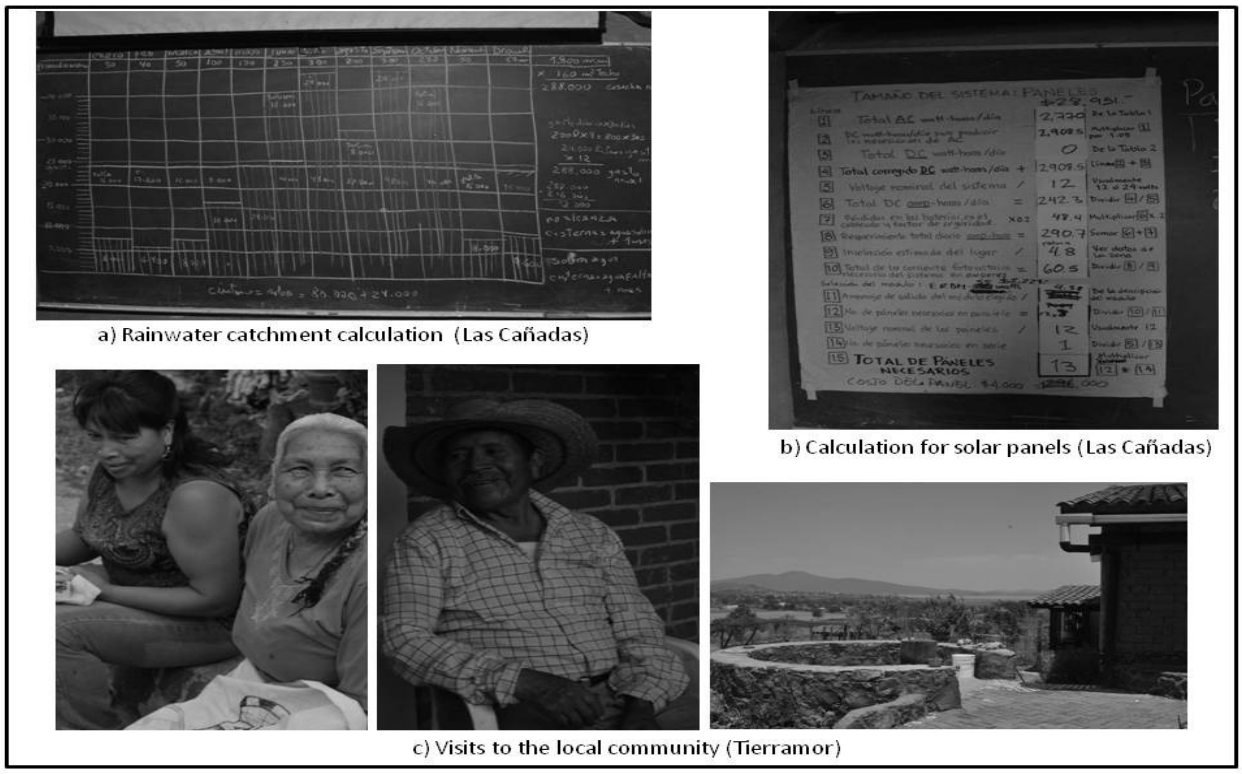


Figure 23: EE_Didactic methodologies and integrated learning III

Integrated learning is further promoted if there is more than one course instructor as this allows a broader scope of problem and solution analysis. Tierramor was excellent in its performance of inviting a number of experts to the "fundaments of permaculture" course which allowed different inputs from several teachers.

There is a strong linkage between the projects and with schools and universities. Tierramor and CEDER receive university students; promote academic investigation, cooperation and exchange of knowledge. Las Canoas Altas works especially with children from Waldorf Schools who usually stay for three days to experience the farm. Tierramor points out that short courses are usually more popular (three to four days), and feels that it is especially the urban middle class that is seeking capacity building.

Unique is the cooperative volunteering, implemented by CEDER, which links community work, capacity building and funding: HSBC[28] sponsors the material and sends its employees to work one day in the community, e.g. constructing a Ferrocement tank. This is an efficient approach of

[28] Credit institut

implementing capacity building for urban participants and the local community, and further provides free material and labor which benefits the community.

In terms of volunteer management a rather critical view point was expressed (Tierramor, Las Cañadas, Rancho Acayali), claiming that it often requires time to train the volunteers and that it often implies high energy investment, sometimes with little return due to lack of commitment, strength and knowledge. Thus, their selection criteria's have become stricter and are based on time commitment and specific knowledge the volunteer might contribute to the better management and improvement of the farm. Las Canoas Altas, on the other hand, focuses on volunteer management and is member of WOOFING Mexico since 2006. In this way the project receives support in terms of labor and time commitment from the volunteers but also needs to focus on volunteer management. It has an established work plan developed, displayed on the black board (see figure 20d) in order to define tasks and responsibilities. Additionally there are weekly learning activities and healthy vegetarian cooking is promoted; recipes for every day are provided with a recipe book (see figure 20a). Also volunteer accommodation is available albeit simple (see 20c).

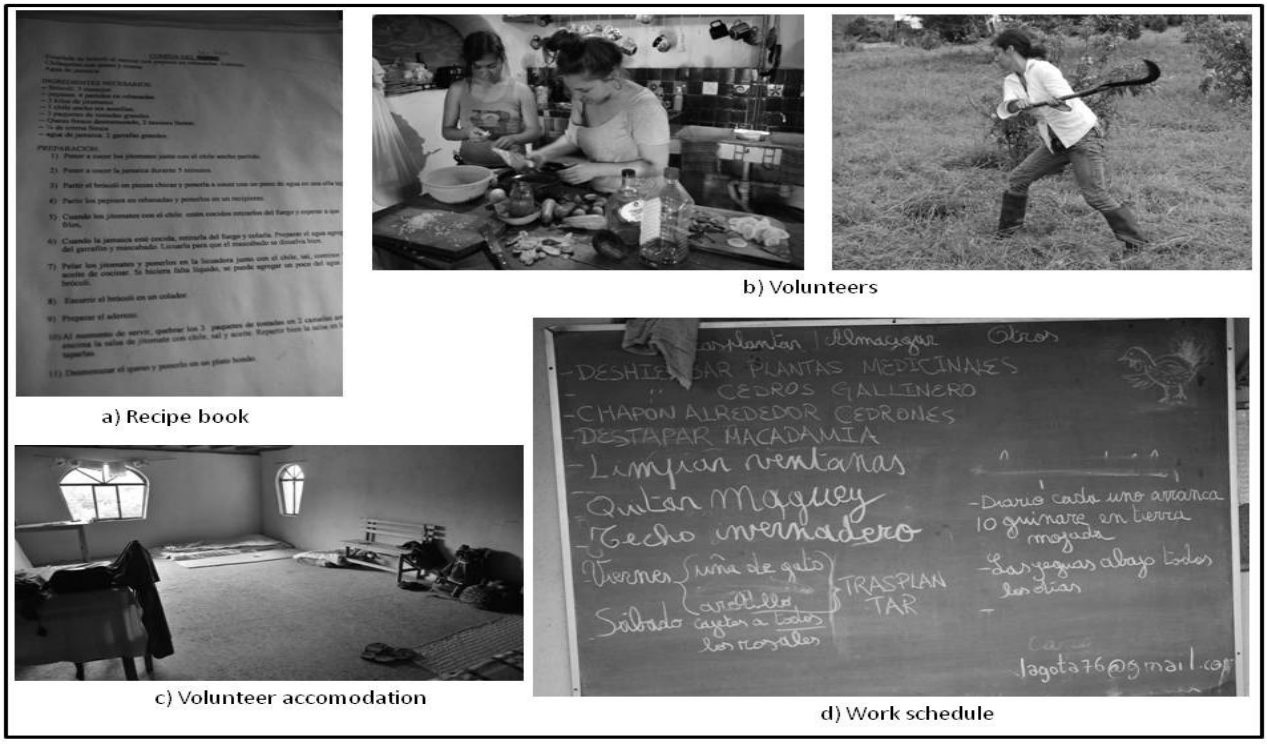


Figure 24: Volunteering, Las Cañadas

Table 11: Strategies_EE

Tierramor	Las Cañadas	Rancho Acayali	Las Canoas Altas	CEDER
ENVIRONMENTAL EDUCATION				
Theoretical-practical courses, costs				
Various courses per year, cost around 5000-6000 pesos each (5 - 6 days)	Two courses per month, cost around 5000-6000 pesos each (5-6days)	Around 4 times a year; cost 1300 (2 days)	Summer course, 5 days, 2200 pesos	Various courses per year, cost around 2000 pesos (3days); long courses, e.g.11 days for 13.000 pesos
Topics				
Introduction to permaculture	Introduction to permaculture, permaculture design	Food preserves	Biodynamic agriculture	Management of minor species
Permaculture Design	Sustainable living	Horticulture	Biodynamic apiculture[29]	Communitarian development
Flower therapy	Sustainable architecture		Horticulture	Organic agriculture
Keyline design	Agro ecology, -forestry, -biodiversity		Learning activities: making bread, jam, honey, yogurt, cob construction	Organoponia and editable flowers
Herbal & medical plants – biodegradable products	Ecotechnologies & renewable energy		Horticulture	Bioconstruction
Food production	Bio-intensive horticulture			Drainwater management
Flower therapy	Seed production			Solar Technology
	Edible forest, forest management, wood production			Logical framework for proposal elaboration
	Egg production and chickens			Water catchment tank construction
	Natural & sustainable cooking			Compost toilet construction
	Dairy production & livestock			Dom & Bovedas Construction
Other services				
School and university visits	EA for kids and schools		EA & logging for kids (Waldorf schools)	Meetings & conferences
Guided visits	Accommodation		Natural consulting	Accommodation
Natural consulting	Eco-tourism on small scale: visits of the forests, participation in the vegetable garden			Agro tourism: walks through the forest, going by horse, mountain biking routes
Conferences (2-4 hours)				To rent space for private events
				Cooperative volunteering
Integrated learning				
Dances and movements	Temazcal	Temazcal	Constant exchange, national and international volunteers	Temazcal
Session: the art of listening	Spirituality: one night camp fire with personal contribution (dance, music, yoga)		Painting workshops, color analysis, team work, sensibility activity	
different teachers	two main instructors for the course		Influences of the cosmos	
Participation				
School visits, environmental promoters, universities	School and guided visits		School visits from Waldorf Schools: stay for about 3 days,	University cooperation
Only volunteers with specific knowledge and time commitment	Only volunteers with specific knowledge and time commitment	Rather critical towards volunteer management	Strong volunteer engagement, woofing Mexico since 2006, 2-3 volunteers at a time	Volunteering
Urban middle class is most interested in capacity building short courses are more popular (3 till 4 days)				Cooperative volunteers: HSBC funds materials & people, who then contribute to one day working in the community

[29] Beekeeping

4.2.4. STRATEGIES OF COMMUNICATION

Efficient strategies of communication are fundamental within EEIs and as indicated in table 12 communication strategies are further subdivided, taking into account how those are applied within feedback/monitoring, community building, expert networking and promotion/internet profile. 4.2.4.1. Feedback

To receive feedback from the participants and thus, establishing some kind of monitoring of the implementation of a course, is not only beneficial for the environmental educator but also for the participants. To collect feedback encourages the participant to reflect on own experiences and offers the opportunity to express what was liked most and what was liked least. Las Canoas Altas for example uses a "volunteer comment book". This has the advantage of collecting feedback in a written form and can be revised when required.

Tierramore and Las Cañadas use participant's experiences within its methodology approach for holistic learning – and encourage the participants to talk openly about their opinion and viewpoints. Feedback was highly important. Every day the participants were asked what part of knowledge and learning they had liked most. Similarly, asking feedback from the participants at the end of the day, this was done at Las Cañadas.

Tierramor and Las Cañadas have developed a "certification ceremony" which is held on the last day and invites the participant to share their opinion about the course and to explore whether expectations have been met, taking into account original objectives and motivation for the course. Each participant was given the certificate of another person which they had to hand over commenting on the persons´ input or personality. It was a ritual of thanking one another for having participated in the course and sharing this experience together. Thus, to search for feedback in an interactive way supports community building between the participants, exploring own thoughts, sharing them and listening to others.

4.2.4.2. Local community building

Local community building is facilitated by efficient communication, exchange of knowledge and integration. Tierramor has established some strong links with local farmers, seeking their advice and offering support. The course program included a visit to a local farmer where the participants spent one afternoon, helped with the compost and used the time for questions. Additionally local

community members were invited to share local knowledge and experiences and offered sessions of movement, biodiversity and herbal plants for example.

CEDER invites local community members to participate in its courses and offers scholarships for those who cannot afford to pay the fees of a course. Those kinds of initiatives encourage communication between the participants of the course and the local community.

Las Cañadas has developed a well established reputation over the years and many of the applied ecotechnologies and farm management strategies are implemented by the local community. Nevertheless, Rancho Acayali observes that it can be rather difficult to engage with local farmers as there seems to be a lack of interest in agrobiodiversity: "They are not interested in growing different varieties of crops as they are used to mainly eating corn and beans, there is a certain lack of knowledge and education regarding vegetables and healthy food". This reflects the necessity of integrating the local community in capacity building and forms of EE in order to create awareness, knowledge and achieve participation.

4.2.4.3. Expert networking

Another form of efficient communication is expert networking. According to Las Cañadas it is fundamental to work with the local farmers as they know the local conditions and traditions – a strategy which is also applied by Tierramor. In addition, its interlinkages, knowledge and support of other EEPs are impressive. During the attended course in 2011 there were more than six instructors who shared their knowledge with the participants. This emphasizes the successful application of expert networking, community building, cooperation and mutual support instead of competition and monopolization and has been outlined as one of the objectives of ESD (see Wals, 2009).

Furthermore, it was interesting to find out the interlinkages between Tierramor, Las Cañadas, Rancho Acayali and Proyecto San Isidro. The facilitators of the projects used to meet regularly in order to exchange experiences and knowledge for about 10 years as the "cosecha sana" group. They initially had plans of creating one common participation certificate for their courses and to publish a book together but it became more and more difficult to find the time for their meetings as everyone was busy with their own project. Nevertheless, links between the projects continue to exist (personal and links on websites).

4.2.4.4. Internet

Another important communication strategy is the promotion and internet presence of the websites. Las Canoas Altas promote their project via their website, local promotion and via the Woofing networking which they are part of. Outstanding is the internet web site from Tierramor as it does not only offer information about the project, its objectives and its courses but also provides an extensive amount on information relating to permaculture and sustainable resource management including articles, academic publications, studies, photos, guides, manual and links to other web pages and projects.

Table 12: Strategies_Communication

Tierramor	Las Cañadas	Rancho Acayali	Las Canoas Altas	CEDER
COMMUNICATION				
Feedback/monitoring				
Every morning it was reflected about the last session, stating of what was liked most and least		No data	Usage of "volunteer comment book"	No data
At the end of the course participants gave final feedback; "certification ceremony"				
Community building				
Local community is interested in use of alternative energies and technologies and forms of agriculture, collaboration with local farmers: exchange of knowledge	Many of the applied ecotechnologies and farm strategies are duplicated and implemented in the local community	It is rather difficult to engage with local farmers: "...there is a certain lack of knowledge and education regarding vegetables and healthy food"	Community is impressed by the construction of the house as the majority of buildings in the area are cement-based	Scholarship for local participants
Expert networking				
They used to meet regularly to exchange experiences and knowledge, had plans of creating a common "participation certificate" and to publish a book together but it became more and more difficult to find time for their meetings, nevertheless links between the different projects continue to exist (personal and links on websites)				
Excellent in terms of inviting other expert to the workshop	It is fundamental to work with the local farmers		It is fundamental to work with the local farmers	
Promotion / internet presence				
Outstanding website with an extensive amount of material such as relevant publications, studies, articles, guides and manuals - highly recommendable!	Very good reputation over the years; website	promotes his courses via link in the website of Las Cañadas; generates previous participants list in order to send them information regarding new courses/seed variety	Website & local promotion	Excellent website

4.2.5. STRATEGIES OF ORGANIZATION AND FINANCE

Strategies of organization and finance (see Table 13) depend on the type of project. For example, Las Cañadas, a cooperative with 22 members, allocates specific tasks to members of the community, receives regularly support from volunteers with specific skills from all over the world and works together with local farmers and communities. Grupedsac, the civil association with two demonstration sites (CEDER and ITT) has 25 members in total and, as a more institutionalized organization, follows specific procedures for implementing a community project: First a participative diagnostic is facilitated in order to receive support from the organization. Participation in a capacity workshop and contribution of labor will then be required from the participants of the community in order to obtain free materials and assistance from the experts of CEDER and ITT.

Las Canoas Altas focuses on volunteer management and has set up a schedule for the activities of the volunteer which include once a week various "learning activities". Rancho Acayali is working with one employee from the local community who supports him from 8am till 3pm and has helped to increase the production about 50%.

Projects obtain financial income from their courses, other EE services, seed sale, organic and biodegradable products. CEDER focuses more upon proposal writing and regularly receives private/public funds. Table 13 includes a list of organisations and foundations which have supported the project such as FUNDEMEX, Habitat Mex and Kellog. This is a good indication for institutions which might support similar initiatives. Furthermore, it offers other creative/upcycled products and fundraising events such as concerts (see figure 24) and seeks cooperation with big companies such as Wal-Mart, promoting cooperate social responsibility, e.g. with Christmas baskets.

Figure 25: Fundraising (CEDER)

Concrete figures about financial income based on those activities were not investigated but should be considered in future research.

Table 13: Strategies_Organisation and finance

Tierramor	Las Cañadas	Rancho Acayali	Las Canoas Altas	CEDER
Organization				
Family farm with occasional volunteers, good linkages to local "experts"	Cooperative, 22 members, each with designed tasks	One employee (8 am - 3 pm, 100 pesos/day) helped to increase the production about 50%	Focuses on volunteer management, 20-25 volunteers per year	25 employees in total with two EE centers (D.F. and Oaxaca)
Consulting is not free but is paid for with exchange of goods; holistic management	Fundamental to work with local farmers as they know best about site specific conditions and of how to work the land		Once a week various "learning activities" such as making bread, yogurt, honey, jam	1. participative diagnostic, in order to be a benefit of the project: participation in capacity work shop and contribution of labor; materials and experts will be offered
Funding/finance				
Courses, exchange of good with local community, sale of organic products (shampoos, soaps,)	Courses, seed sale; organic products	Food sale for local market, once a week delivers to three different shops/stalls (established buyers), courses, seed sale	n.d.	Courses, seed sale; organic products
Critical of institutional funding as this often implies restrictions for the project				Sale of recycled products, e.g. bags, presents with cause, (sale and distribution facilitated through on own homepage)
				Concerts, xmas basket with natural products
				Funding from FUNDEMEX, Habitat Mex, Converse, Merced, Kellog, The Livine Family Ftd., Zol Alstom, Gonzalo Rio Arronte, ADO, Wal-Mart

4.3. FEEDBACK FROM PARTICIPANTS, LAS CAÑADAS

Out of 15 surveys, there were six male and eight female participants (one individual did not provide information on the general data statistic). Five participants were aged 50 years and above and four between 20 and 29 years (see figure 26). Additionally, figure 27 shows that especially teachers seek capacity building for ecotechnologies and renewable energies. Interesting to note is that most of the participants actually live in big cities, a total of 5 were came from the capital Mexico City. Participants travelled from different federal districts in order to participate in the course; only one person was actually from Veracruz where Las Cañadas is located (see figure 28).

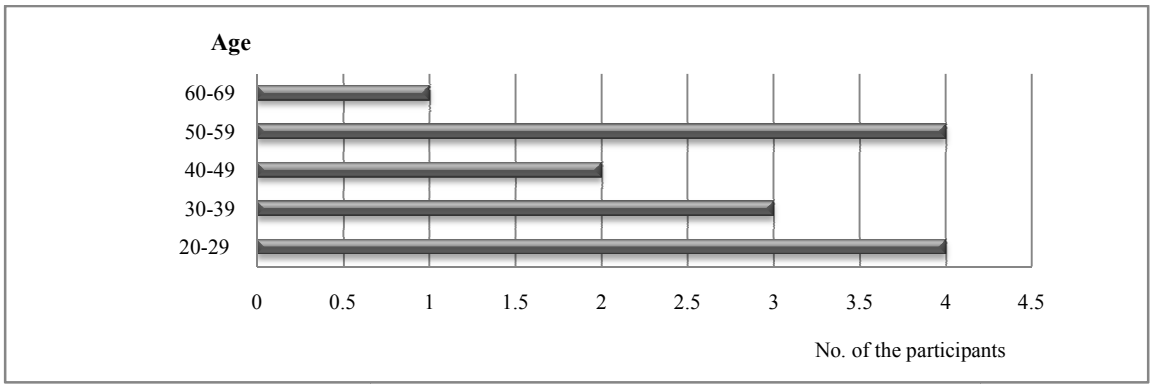


Figure 26: Survey Part I_Ag

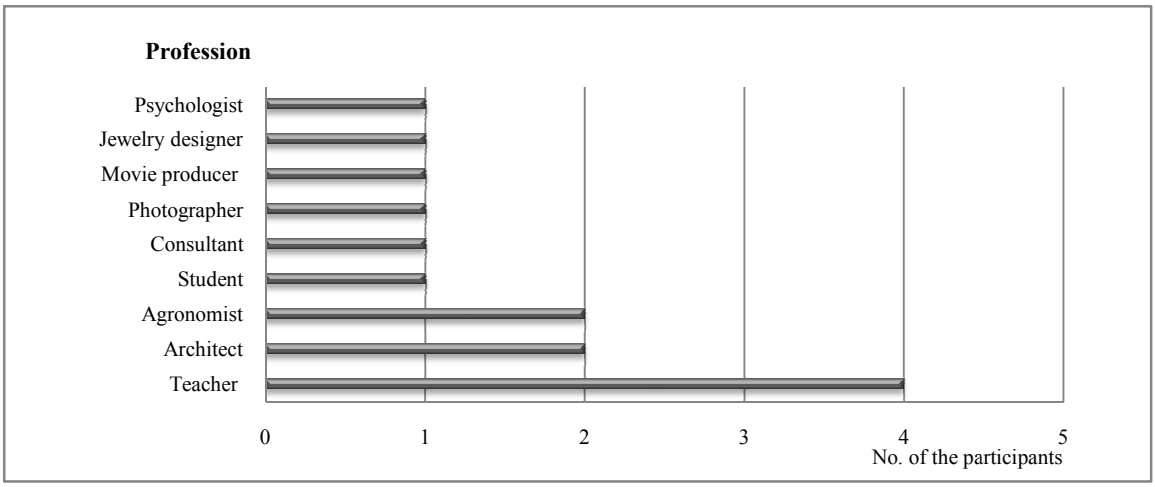


Figure 27: Survey Part I_Profession

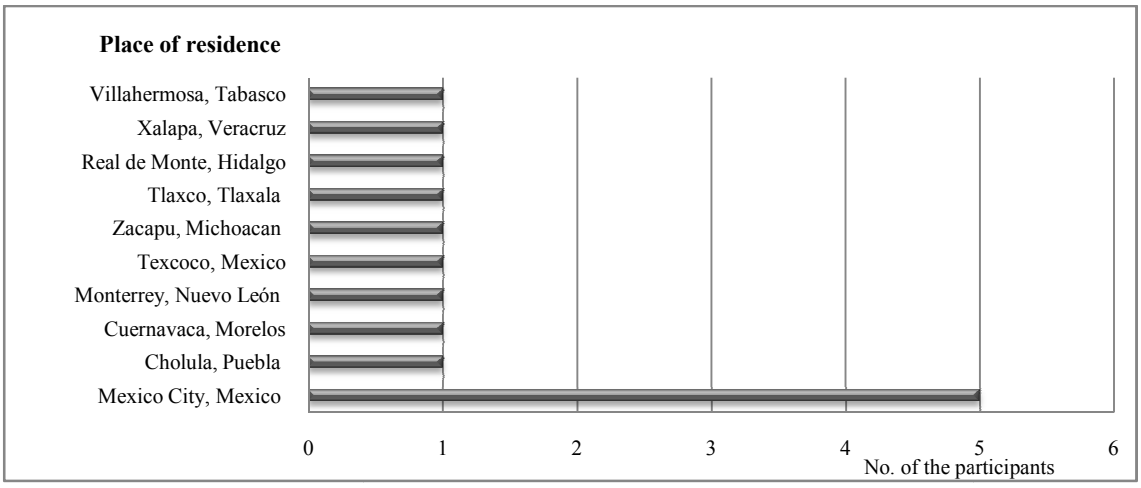


Figure 28: Survey Part I_Residency

In the first part of the survey participants were asked about their expectation of a sustainable community project (see figure 29). Food production was named most (five times), followed by permaculture and holistic (environmental) education (three times). Furthermore, topics of bioconstructions, (waste) recycling, resource management and ethical values such as respect, tolerance and spirituality were considered as important. Other topic expectations mentioned (not depicted in the figure) were composting, function of animals such as chicken and rabbits, ecotechnologies, renewable energies, keyline design, nature-society understanding and health.

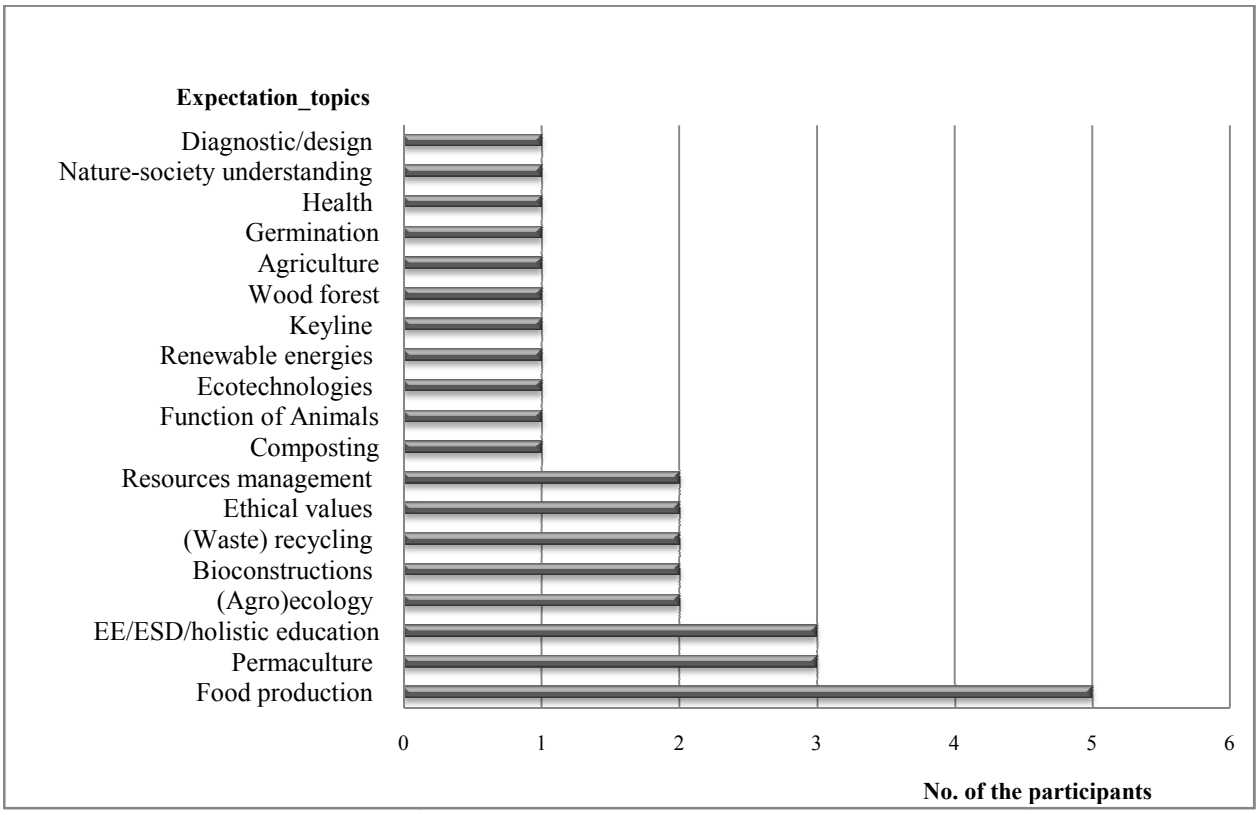


Figure 29: Survey Part I_Expectations_Topics

Encourage less impact on the planet and sustainable/integrated change were considered to be the most important general gains of a sustainable community project (see figure 30) Due to the open-ended questions answers were categorized in order to capture main tendencies. For example, conservation/regeneration of the soil, resources management and recycling were included in encourage less impact on the planet. Auto sustainable way of life, consciousness of consumption patterns and food production were included in the sustainable/integrated change perception.

Other important general gains identified refer to community building and capacity building. This is interesting as those answers reflect the broader impact of such project. A sustainable community project encourages active participation, exchange, strengthens community building and the linkages between different stakeholders.

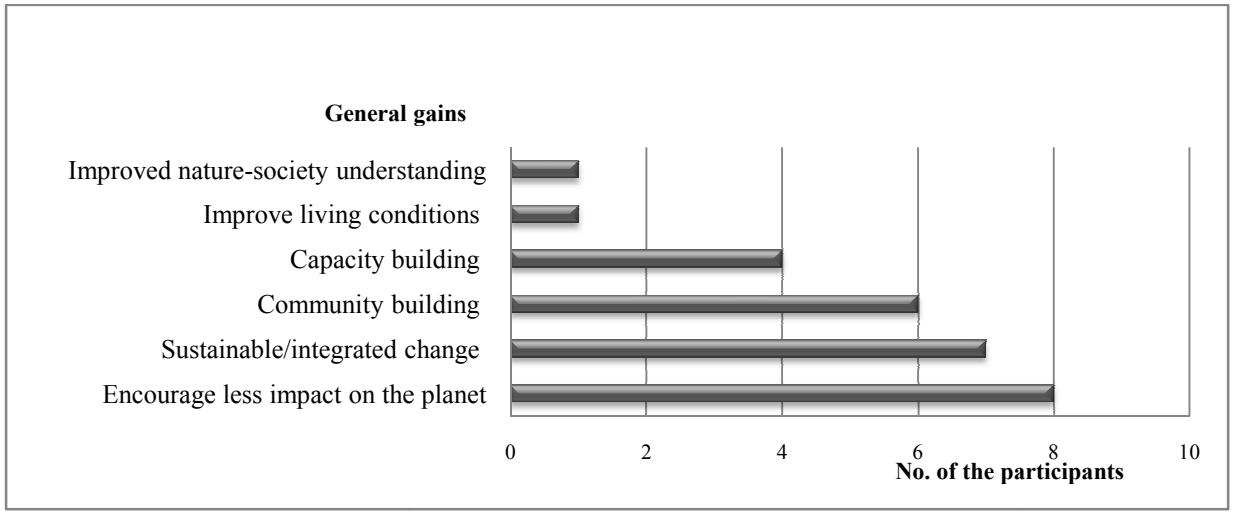


Figure 30: Survey Part I_General gains

When questioned about the personal benefits of participating in an integrated community project, conditions such as mental peace, health, spirituality and personal satisfaction were mentioned most (seven times, see figure 31). Thus, a sustainable community project does not only benefit the environment and the community but also oneself; one feels good about his actions, conscious, aware and as a part of the solution. Community building and to share knowledge (combined as one category as community building is defined by communication and information exchange) were mentioned five times and emphasizes the importance of exchange of knowledge – with participants contributing to the learning process, exploring different viewpoints and diversity within problem analysis and solution approaches. Capacity building/EE was named five times, highlighting the importance of transmission of new integrated environmental knowledge and studies. Furthermore, the figure indicates additional identified personal gains such as to encourage less impact on the planet (includes answers such as conservation of the soil and sustainable resource management), improvement of life quality, sustainable development, improved nature-society understanding and expert networking.

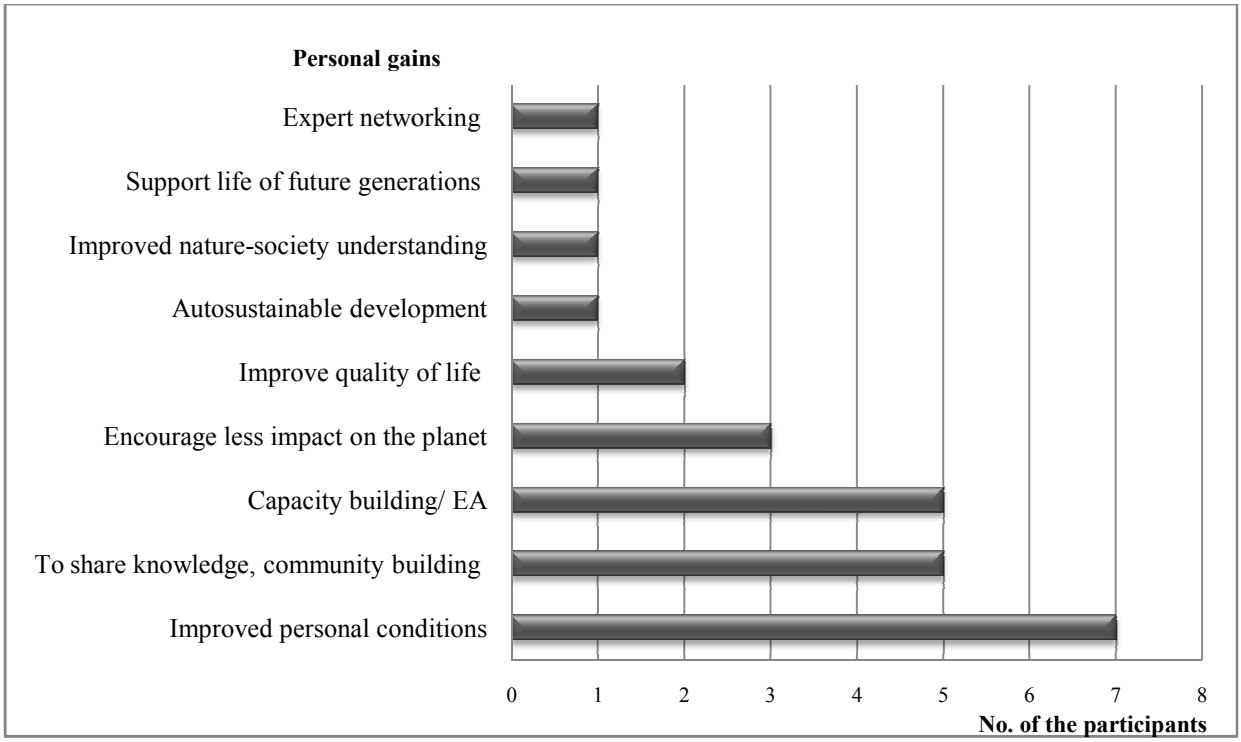


Figure 31: Survey Part I_Personal gains

When asked about possible contribution to a EEP, ten participants stated that they could imagine to share information and knowledge through giving workshops or classes on specific topics dependent on their capacities (each person defined those). Support activities and installations (especially working in the vegetable garden, named four times) was mentioned eight times. To seek further capacity building and conducting research was mentioned once (see figure 32).

The second part of the qualitative survey referred to the evaluation of the workshop of Las Cañadas. It shows that most participants knew about the workshop due to internet research, which shows the importance of communication strategies and internet presence applied by EE Projects (see figure 33).

Identified by most participants as the strength of Las Cañadas was the real-life application of sustainable living and efficient resource management (see figure 34). This shows how important it is for an EEP to lead with example and not only teach theoretically about possible changes and a more self-sufficient way of life. Also, the choice of topics was valued as one of the most important strengths of the workshop. Especially mentioned were the topics of petroleum/energy

descent, waste recycling, organic food production, wood forest, water bombs and sustainability (not depicted in the figure). Other strengths mentioned refer to didactic methodologies applied, including materials and communication (mentioned five times), practical activities (named three times), the instructors and their life philosophy (mentioned twice), capacity and community building and visits to the local community (mentioned once each).

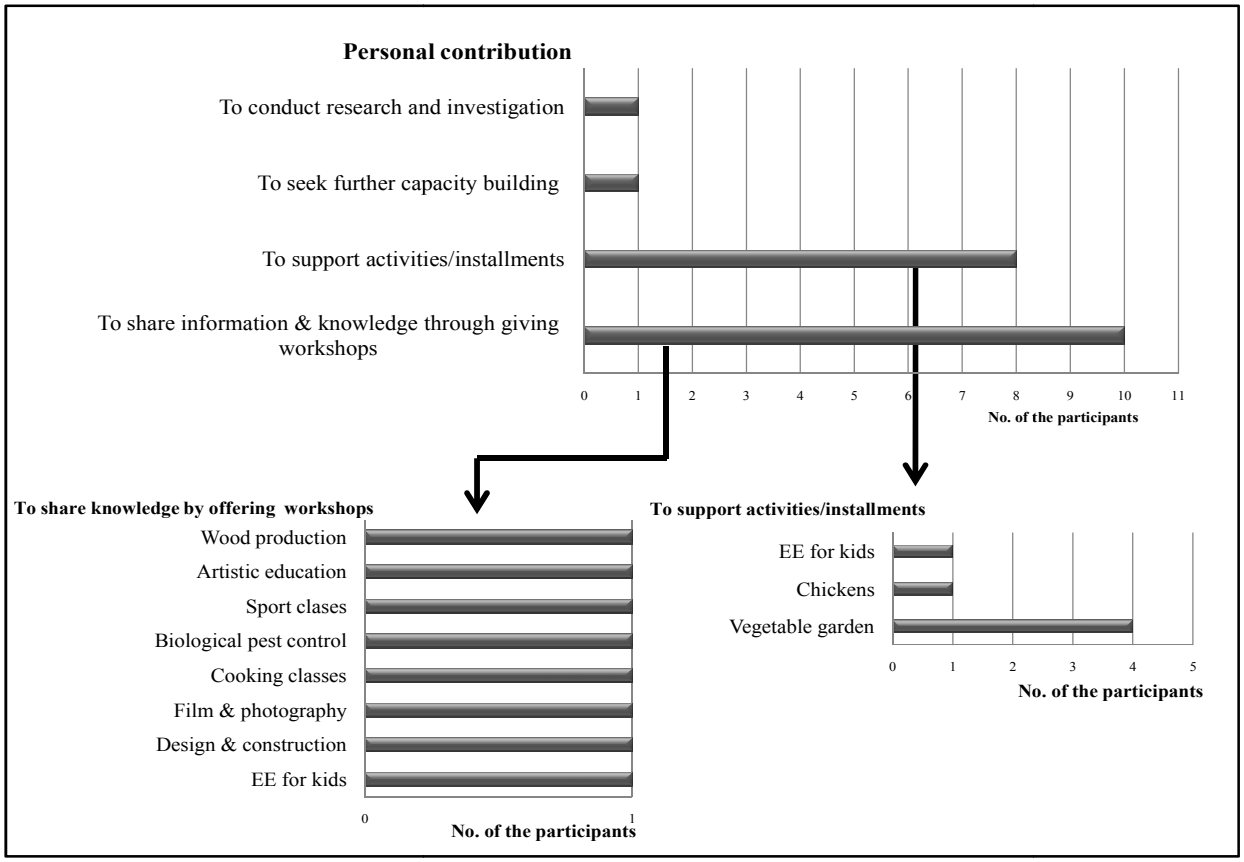


Figure 32: Survey Part I_Personal Contribution

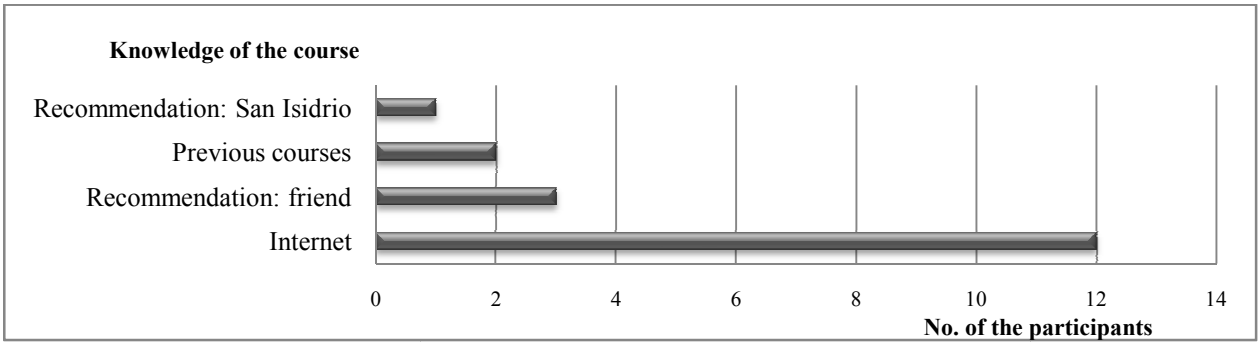


Figure 33: Survey Part II_Knowledge of the course

Identified by most participants as the strength of Las Cañadas was the real-life application of sustainable living and efficient resource management (see figure 34). This shows how important it is for an EEP to lead with example and not only teach theoretically about possible changes and a more self-sufficient way of life.

Also, the choice of topics was valued as one of the most important strengths of the workshop. Especially mentioned were the topics of petroleum/energy

descent, waste recycling, organic food production, wood forest, water bombs and sustainability (not depicted in the figure). Other strengths mentioned refer to didactic methodologies applied, including materials and communication (mentioned five times), practical activities (named three times), the instructors and their life philosophy (mentioned twice), capacity and community building and visits to the local community (mentioned once each).

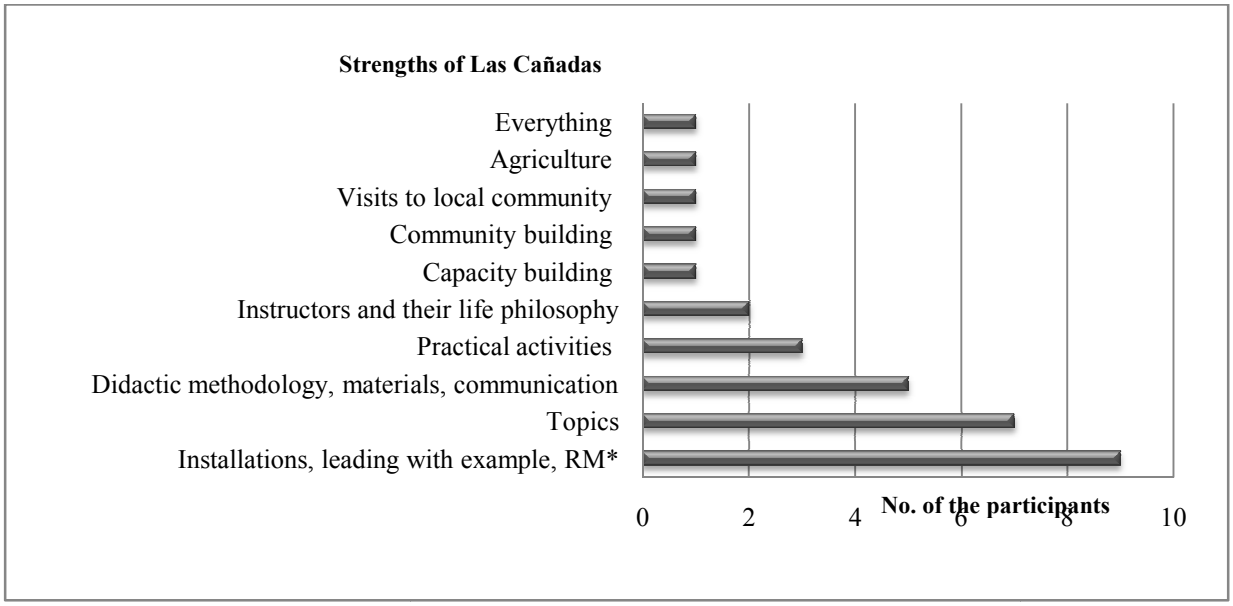


Figure 34: Survey Part II_Strengths

Figure 35 illustrates the weaknesses of the workshop identified by the participants. The responses indicate that specific topics such as electrical installments including (non-solar) water bombs and solar panels, renewable energies and permaculture could have been explored and explained more in order to assure a better understanding. Also, the performance of practical activities and implementation could be improved. In this context the participants referred to insufficient time, material and organization as weaknesses. One person mentioned that maybe one instructor more

would have helped for the better implementation of the course. At the same time three participants were completely satisfied and stated that they did not perceive any weaknesses.

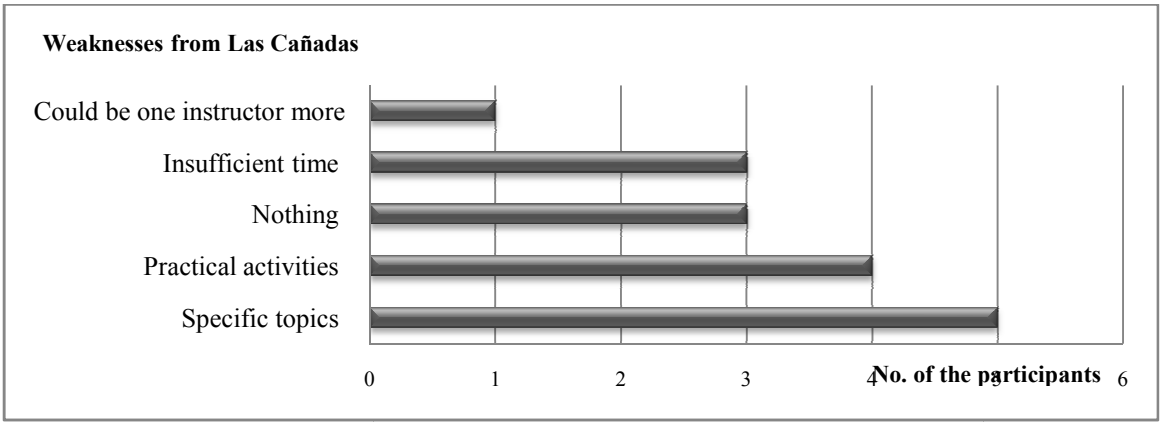


Figure 35: Survey Part II_Weaknesses

4.4. DIAGNOSTIC OF ENVIRONMENTAL EDUCATION PROJECTS IN SAN LUIS POTOSÍ

Initially it seemed that there are far less environmental projects in SLP (due to the lack of available information) but communication to local stakeholders such as students and (university) teachers has facilitated knowledge about existing ecological initiatives. Most EEPs were detected by interactive communication and links through Facebook sites. Especially via social virtual networks (blogs and Facebook) promotion of and linkages between the projects can be observed. Tabel 14 provides an overview of current initiatives and indicates the source of knowledge, e.g. communication with stakeholders or internet research (Facebook). It also shows the number of people associated with the project which is reflected within the number of "friends" or the number of people who "like the page". This gives an indication of how many people know about the project.

Table 14: EEPs in SLP

EEPs in San Luis Potosí, SLP					
Initiative	**Address**	**Type of project**	**Source of knowledge**	**Objectives**	**Comments**
ALCYED	Sierra de Alvarez # 511, Fracc. Villas de Cactus, SLP	100% recycled furniture	Communication (Facebook: 841 friends), personal conversation with founder	Upcycling: furniture from recycled material, ecological network & investigation, work with local communities	Project start 2011, access only with vehicle
Biobab	No data	EE magazine for kids	Interactive communication	Unification of science and art, seeking creativity, EE information and news	Target group: children, parents and teachers
Bioespacio	Centre, SLP	Independent	Facebook (536 friends)	Place for meetings, conferences, documentaries relating to human-nature relations and human rights	Not only focus on EE issues, rather irregular meeting
Ecoparadigma	Sierra de Álvarez 246, colonia Lomas 4 sección, cp. 78216, San Luis Potosí, SLP	Civil association	Interactive communication	Work with universities	Very good internet presentation with many interesting links, but last update in 2008
La Tierra Respira	No data	Ecological organization	Communication, in Facebook (104 like this page)	Ecological organization which seeks the reflection, debate and proposals for a revitalization of the nature-society systems; to offer alternative ideas and visions with respect to development and management of ecosystems	Facebook site refesr to service and activities offered, construction with adobe (2days 200 pesos and temazcal), recognition of the permaculture concept
Mundo Verde San Luis	Virtual	Governmental project, supported by SEGAM	Facebook (394 friends)	To share and publish information regarding environment challenges, ecological projects and events in SLP	
Reciklo	Himalaya #910 A oficina 8 Lomas 4ta., SLP	Community organization?	Facebook (29 like this page)	To promote education about recycling by a group of young people committed to the environment, responsibility of a green world, to offer containers for recycling	Phone line not working, at time of research
Reco	Calle Pedro Velez s/n, El Palmar Del. Villa de Pozos, SLP	Independent	Interactive communication (Facebook: 250 friends), personal use of service	To promote EE and recycling	Difficult to find as Facebook account is under the name of the founder, still limited organization & structure
Vida sobre ruedas	Meeting point: Park Tequispan, Centre SLP	Community organization	Own participation, Facebook (1.643 like this page)	To promote cycling in the city in order to reduce contamination, to make aware of the rights of the cyclist, community building	High participation rate: once every week, cycling the streets at night, with music
Trabajando con la Tierra	Huerta Cochinilla: Fuente de cristal 118, Balcones del valle, San Luis Potosí, SLP	Community organization	Communication, (282 friends)	A collective who seeks to implement an organic vegetable garden which then will function as a demonstration site and for capacity workshops, and to collaborate with other EEPs.	Project start 2011, urban vegetable gardens & compost workshops

Thus EEPs in SLP are not as scarce as first assumed and a general environmental movement is notable. Many have only emerged recently, are still little known within the local community and concentrate on specific target groups. Vida sobre ruedas stands out; at the time of research, the project had 1643 votes for "I like this page". Thus, it is by far the most known project seeking less environmental impact through the usage of bicycles and making aware of the rights of cyclists. It is especially known for its weekly nocturnal bicycle tour through the city, which attracts up to 2000 participants. The collective also organizes activities with blind people, offering them bike rides on a tandem. It is the only project which has achieved public and media attention due to the integration and active participation of different target groups and efficient promotion strategies. They sell little cards which can be pinned on the back of the bicycle, and posters and banners indicate the meeting point for the weekly nocturnal bicycle tour. Community building is encouraged due to the interaction of participants and represents its main strength. It is an activity which can easily be joined by anyone and which makes the people feel that they belong to a movement with a cause.

Most EEPs concentrate upon the promotion of environmental services such as recycling (Reco, Reciklo, ALCYED), environmental information and awareness (Biobab, Mundo Verde San Luis, Ecoparadigma). The project Mundo Verde de San Luis Potosí, funded by the governmental institution SEGAM, is a purely virtual initiative, highlighting and sharing information regarding the environment, ecological projects and events in SLP. Other initiatives offer EE for kids (Biobab) or work with vulnerable communities around the city (ALCYED). Bioespacio offers his space for different activities relating to the environment, development and human rights. It is one of the few initiatives with easy access and a set permanent location within the city of SLP. Nevertheless, it does not feature regular meetings or workshops; instead they are rather spontaneously facilitated.

There are some (virutal) linkages between the projects, e.g. via the Facebook websites, and ALCYED and Reco have started to work together. Some projects have begun to offer EE courses (ALCYED, Reco, Ecoparadigma) and practical workshops which promote exchange of capacity building and work force (Tierra Respira, Trabajando con la Tierra); nonetheless, there is a lack of regularity, frequency, continuation and promotion. Rarely there is a planned schedule for upcoming courses and capacity building initiatives are rather spontaneously communicated and promoted.

Thus, most EEPs in SLP focus on environmental awareness, diffusion of ecological knowledge and services such as recycling, and less on interaction and interactivity encouraging behavioral change and community building. The impact of such projects and movements remains limited because of insufficient divulgation and communication strategies. The task remains of defining project strategies which combine workshops, capacity building, meetings and conferences promoting EE within the ecological, social and political sphere, applying efficient organization, administration, communication and evaluation; creating awareness of production and consumption patterns; supporting community building and offering access to theoretical and practical environmental solutions.

4.5. THE ENVIRONMENTAL EDUCATION PROJECTS IN COMPARISON

"… it should be recognized that in many instances practice is ahead of policy. This is to say that in many parts of the world there is a lot of ESD activity in (…) non-formal learning settings that are not or hardly supported by policies and structures put in place by governments" (Wals, 2009:13). This is true for EE efforts in Mexico. As highlighted by this study independent EEPs in Mexico increasingly focus on integrated and interdisciplinary thinking, new ethical values, networking and cooperation of EEIs; the promotion of ecological construction, organic food production, ecotechnologies, nature restoration, participative organization and education, holistic learning, sustainable living, community building and financial sustainability which reflect the main objectives of ESD.

Furthermore, the five investigated projects implement a more critical environmental education and support the social transformation based on cooperative learning as recommended by Sauvé (1992). In comparison, Tierramor has been most successful in applying the permaculture concept. It combines the objectives of ESD, promotes an integrated vision of sustainability and shares knowledge and allows the participants to actively learn from real-world context (NAAEE, 2000).The analysis of CEDER has highlighted some interesting management strategies such as the cooperative volunteering and donor sources for funding from public and private institutions. CEDER, as the longest established project, offers workshops which are highly important for communitarian sustainable development such as elaboration of impact indicators, proposals and communitarian diagnostic. Las Cañadas, due to its large area, promotes many ecotechnologies

and is an excellent example in terms of organization by being a cooperative with more than 22 members including many experts in different fields (organic food and seed production, EE, sustainable live stock and chicken management). Real life application of sustainable living and resource management was considered to be one of the strengths of Las Cañadas as it allows some envisioning about how sustainable change can look like. With reference to the EEPs in SLP it can be noted that practices of sustainable resource management are still scarce as there are only few permanent projects which provide sustainable infrastructure and installations. Tierra Respira and Trabajando con la Tierra plan to implement those over time and have started with participative workshops such as building a dry toilet, constructing with adobe and urban gardening which reflects a participatory process aimed at transformation (Sauve, 1992) and enhances its legitimacy within society based on collective construction (Muñoz, 2002). Las Canoas Altas has been outstanding in terms of volunteer management, promoting an active exchange of learning, capacity building and work force.

4.5.1. COURSE TOPICS AND COST

It is important to keep in mind, that interesting course topics encourage participation. Highly important are courses which focus on activities and solution approaches which can be easily reproduced (also within urban settings) such as elaborating biodegradable products, implementing natural roof tops and organoponia (see CEDER, Proyecto San Isidro, Huerto del Ts'unu'un or Granjo Tequio). It is fundamental to respond to the participant's interests in terms of course contents (see Muñoz, 2002) but also to explore new academic studies and methods in unconventional courses such as keyline design and soil science for example (COAS and Gaia Sana), elaboration of a logical framework for proposals and practical construction courses (CEDER).

As analyzed, prices for EE courses have been similar but some projects offer scholarships, group discounts, exchange of work and capacity building, and special discounts for certain target groups such as students or economical underprivileged (see COAS and Huerto del Ts'unu'un) . This supports integration and diversity and widens the impact of EEPs and encourages the participation of multi-level stakeholders (see Wals, 2009). Some projects have initiated pure practical workshops at little or no cost for the volunteers (e.g. Gaia Sana, Tierra Respira and

Trabajando con la Tierra), which is a efficient way to be part of a sustainable development process, enabling practical knowledge and implementation of sustainable infrastructure. EE courses in SLP are offered infrequently, with little continuation and promotion. EE is rarely interactive, even though first steps into this direction can be observed (Tierra Respira and Trabajando con la Tierra).

4.5.2. COMMUNICATION AND PARTICIPATION

To collect feedback from the participants only allows an inner reflection of what has been learned but also encourages critical thinking and the sharing of thoughts and knowledge (Las Cañadas and Tierramor). It not only allows an inner reflection of what has been learned but also encourages the sharing of thoughts and knowledge. It means to critically engage and to re-conceptualize new ideas. It means to question, to doubt, to summarize, to confirm and allows recognition of different understandings and thus, opens a wider perspective of learning. Also the described certification ceremonies by Tierramor and Las Cañadas support community building between the participants by exchange of viewpoints and experiences. Further community building between the participants of the course and local actors is promoted by integrating local community´s knowledge and experiences (Tierramor and Las Cañadas).

The expert networking and linkages between several permaculture projects was highlighted and is one of their main achievements, characterized by mutual support, exchange of knowledge and sharing objectives of sustainable living. Partnerships and networking with other EE organizations or movements increases performance and impact of an EEP (COAS, Gaia Sana, Tierramor) and should be one of the future objectives of the EEPs in SLP.

One of the fundamental communication strategies refers to promotion of the EEP via the internet. Regular updates on courses and activities are important as this creates trust in the project and its ongoing efforts of sustainable living, vision and mission. Furthermore, a website promoting other EEPs and information, studies, guides and manuals relating to permaculture, agroecology and sustainable living encourages interest and awareness on the local and global community level (Tierramor, COAS, Huerto del Ts'unu'un and Proyecto San Isidro). The EEPs of SLP promote their objectives via the internet, yet the use of the new media tools (Facebook and blogs) usually requires previous interactive communication in order to access information. The only project

which has been recently really successful is Vida Sobre Ruedas, which has achieved public and media attention.

The linkage with schools and universities is one form of networking and is highly encouraged and promoted by the selected projects. Additionally, cooperative volunteering (CEDER) is a great opportunity to establish links with the private sector, to obtain funding, to enhance community building and to offer capacity building for participants mostly likely from the urban middle class. This target group of stakeholders has been identified by Tierramor as one of the most interested in courses and capacity building. As indicated by the survey, participants aged 50 or above, teachers and urban participants show a strong interest in EE.

Volunteers may be a consistent or temporary part of the EEP. In this context volunteer management is highly important and the EEPs usually seek time commitment, special skills and/or financial contribution from the volunteers. To be part of the WWOOFing networking helps to attract volunteers which actively participate in the EEP (Las Canoas Altas) but also requires appropriate volunteer management. Las Cañadas for example, seek actively volunteers with specific skills. This is a give and take; but limits chances for those lacking expertise but wanting to learn and contribute.

4.5.3. FINANCE

Most projects are privately funded and are financed through courses and other educational services, seed and other ecological or organic product sale. Biodegradable and upcycled products are sold to visitors/participants, on the local market or via the internet (Huerto del Ts'unu'un, CEDER). Gaia Sana, for example, sells organic food baskets to (urban) consumers. The apprentice program by Proyecto San Isidro is an additional source of finance but is more recommended for well established programs with experts in their field. CEDER seeks private and public funding from institutions and organises fundraising activities.

It has not been clear whether the projects had developed a buisness plan in order to plan financial sustainability from the beginning. Las Cañadas, for example, had started with a different concept (eco-tourism and ecological production of dairy products for the contribution in Mexico City) and focuses only recently (since 2006) on EE courses and the promotion of the permaculture concept. Rancho Acayali has mentioned the challenge of generating a high profit and has

highlighted that its income is rather modest. Some additional courses would offer an additional income source, yet time constraints exist. He focuses on organic food production for the local market and has regular buyers for its products. Financial sustainability of EEPs in SLP is one of the main challenges as income from courses or ecological product sale is rarely generated. Again, the project Vida Sobre Ruedas stands out: due to efficient communication and promotion strategies it has achieved financial sustainability.

4.6. BEST PRACTICES – AND FURTHER RECOMMENDATIONS

- Based on the analysis of the results in chapter 4 the following strategies in terms of sustainable resource management, education, communication, participation and financing are emphasized:

Table 15: Practices and strategies for the efficient development of an EEP_Sustainable resource management

Sustainable resource management
• The project should not solely teach ethical values and sustainable resource management but represent their implementation, thus leading with example; it should not simply teach theoretically about possible changes but show how such a change is possible, thus offering vision and inspiration to others: Real life application of sustainable living and resource management
STRATEGIES_simple initiatives, ecotechnologies and bioconstruction
• Implement permaculture design principles, using the OBREDIM[30] design methodology in order to investigate site-specific conditions of a place and use the land in the most efficient way
• Creativity in seeking simple solution approaches for efficient resource management
• Upcycling (car tires, paint bucket flower pots)
• Gray water recycling
• Bioconstruction – use of local resources
• Dry toilets
• Rainwater catchment – roof top and Ferro cement tanks
• Filtering rainwater
• Dehydrator
STRATEGIES_organic farming/food production
• Composting
• Organic/biodynamic agriculture
• High agrobiodiversity
• Agroforestry (fruit trees, leguminous plants, sustainable wood forest)
• Greenhouse
• Seed production
• Animals such as chickens or rabbits, sustainable live stock management
• Rotation of crops and horticulture/chicken area
• Traditional irrigation methods (dams, terraces and trenches)
• Manual irrigation
• Keyline Design
• Obtain site specific information about farming practices – use traditional knowledge
• Experiments with plant and tree varieties
• Consider native abundant plants
• Biocontrol

[30] Permaculture design methodology: observation, boundaries, resources, evaluation, design, implementation and maintenance

The discussed EEIs are all rural projects, nevertheless, it is stressed, that most strategies outlined might also be implemented by urban EEPs. There are certain restrictions in comparison to rural projects (specifically applying to the structure of the EEP – e.g. farming practices and implementation of ecotechnologies), nevertheless urban EEPs (and urban permaculture) are increasingly recognized for their contribution of integrated EE as they attract different target groups and facilitate access to information, communication and EE to a large number of population. Furthermore, urban participants are an important target group, who increasingly seek participation in EEIs. Thus, future research should also include urban EEIs in order to highlight similarities, differences, strengths and challenges in comparison to rural projects.

Table 16: Practices and strategies for the efficient development of an EEP_Integrated environmental education

Integrated Environmental Education
TOPICS
• Good choice of topics such as climate change, energy descent, current local and global social – ecological – economical challenges (see table 10 and 11 in 4.2.1. for a selection of topics)
• The choice of topics is highly important and should reflect interests of the participants (previous research on the interests of the community is recommended) and should include social, environmental, political and economical challenges of the community (see also SEMARNAT, 2010), healthy living and sustainable consumption
• Any topics taught should be well researched and its understanding confirmed by the participants; additional reading material should be provided
• Allow personal contribution from the participants, sharing their knowledge in specific classes or workshops, widening the scope of topics such as art, literature or music
DIDACTICAL METHODOLOGIES
• Use a variety of methodologies such as group dynamics, talks, visits to local communities and exchange of experiences in order to promote active community building, integrated learning, values of respect, tolerance and solidarity.
• Positive learning, converting challenges into opportunities
• Practical activities are fundamental in order teach about solution approaches and give participants the opportunity to explore the practical implementation of theoretical teaching; thus the focus should be placed on theoretical-practical workshops
• Capacity building and work exchange
• Efficient organization: time for comments and questions should be included in the time management of the course and sufficient time should be calculated for the learning objectives– in case that participants advance faster than expected additional prepared topics might be introduced; time management of theoretical sessions and practical activities is highly important but might also differ depending on the group, thus the instructor should adapt to the speed of the learning group; allocate sufficient time and include all participants
• The instructors should be enthusiastic, motivated, convincing and knowledgeable; and more than one instructor is recommended for capacity building courses as this supports integrated learning

The choice of topics, the quality of the instructors and didactic methodologies were highlighted as the strengths of Las Cañadas. Nevertheless, it was stressed that some specific topics were not fully understood due to the complexity and time constraints. Insufficient time in general and in particular for the implementation of the practical activities was mentioned by the participants of the survey highlighting that appropriate time management for the implementation of the EE

courses is essential and might vary for different groups of participants. Also, the scope of the course topics should expand with time, investigating interests of participants and making adjustments where necessary.

Table 17: Practices and strategies for the efficient development of an EEP_Communication and promotion

Communication & promotion
• A well constructed webpage, with regular updates of courses and activities is essential for any kind of community project; additional information on the website relating to sustainable living, appropriate resource management and the environment, including social and political issues, is further recommended
• Handing out cards/flyers to the participants after completing a course increases personal recommendations and a circulation of promotion material of the project
• Seek feedback and comments from the participants during and after a course, encourage group discussions and exchange of experiences, encourage continous monitoring and evaluation and facilitate key stakeholder analysis in order to investigate interest of target groups
• Certification ceremony
• Expert networking and corporation with other EE projects and movements
• Highlight general and personal gains such as improved personal conditions, capacity & community building, sharing knowledge, improvement of life quality and expert networking.
• Active and continuing campaigning

Promotion of the EEP is highly important as this attracts participants for the EE courses. The EEP should highlight gains and impact in order to motivate stakeholders to take part in the project and to facilitate funding. For example, encourage less impact on the planet, sustainable change; community and capacity building were considered the most important general gains of an environmental community project. As personal gains were identified improved personal conditions, capacity and community building, sharing knowledge, improvement of life quality and expert networking. Those aspects should be outlined as general objectives of the project and should be promoted as such.

Even though it has been shown, that the projects seek feedback from the participants in order to monitor and evaluate own EE efforts, written evaluations are rarely conducted. Therefore, further emphasis should be placed on investigating social impacts (this could be implemented by the EEIs themselves in order to define the impact they create) by actively engaging with previous participants and collecting information of how they have applied new knowledge in their daily life or work structures. Another alternative would be to facilitate a test at the end of the EE course

in order to determine how much the participants have understood or how much they remember from the course content.

Table 18: Practices and strategies for the efficient development of an EEP_Participation and stakeholders

Participation and stakeholders
• Do not exclude – try to target all types of stakeholders and age groups, consider where to leave leaflets/brochures and information about the sustainable project
• Visits to local communities, seeking local knowledge and experiences
• Visit schools and promote teacher training on integrated EE
• Develop urban sustainable projects and solution approaches with easy access and continuity
• Networking: inviting experts, students and academic researchers to talk about current socio-economical-ecological challenges
• Let participants be an active part of the project; contributing with their skills and capacities in order to enhance integration and diversity: exchange and sharing of knowledge
• Offer discounts for certain target groups, but also group discount and "packages of courses" for reduced price
• Volunteer management (emphasis on long term commitment & special skills)

The survey shows that most participants would like to personally contribute to the project by sharing information and knowledge through offering workshops or classes of specific topics. It was mentioned that some would like to simply support activities (especially working in the vegetable garden) and installations of the project. Personal contribution from different stakeholders enhances integration and diversity, and encourages an active exchange of knowledge and capacities and, in general, should be promoted more.

Table 19: Practices and strategies for the efficient development of an EEP_Finance

Finance
• Develop business plan in order to receive private/public funding; highlighting general and personal gains such as improved personal conditions, capacity & community building, sharing knowledge, improvement of life quality and expert networking
• courses and other EE services
• seed and organic/biodegradable product sale
• internet sale of organic food basket and upcycled products
• Cooperative volunteering
• Organization of fundraising events and activities

The analysis of finance strategies emphasizes financial sustainability of the projects but lacks concrete figures of income and spending patterns, which would have been interesting to explore

further. Thus, to complement evaluations of EEPs in Mexico future studies should also consider the ecological and economical impact of sustainable projects as this investigation has rather focused upon social impacts they might generate. It is recommended to conduct a feasibility study of EEPs which would offer a detailed economical analysis of annually costs and income and facilitate the development of a business plan for future projects.

Further monitoring and evaluating is recommended in order to define strengths and challenges of an EEP and determine social, economical and environmental impact.

4.6.1. STRUCTURE, FUNCTION, STRATEGY, OUTCOME AND IMPACT OF AN EEP

- The strategies highlighted above can also be conceptualized as structure, function, strategy, outcome and impact of an EEP:

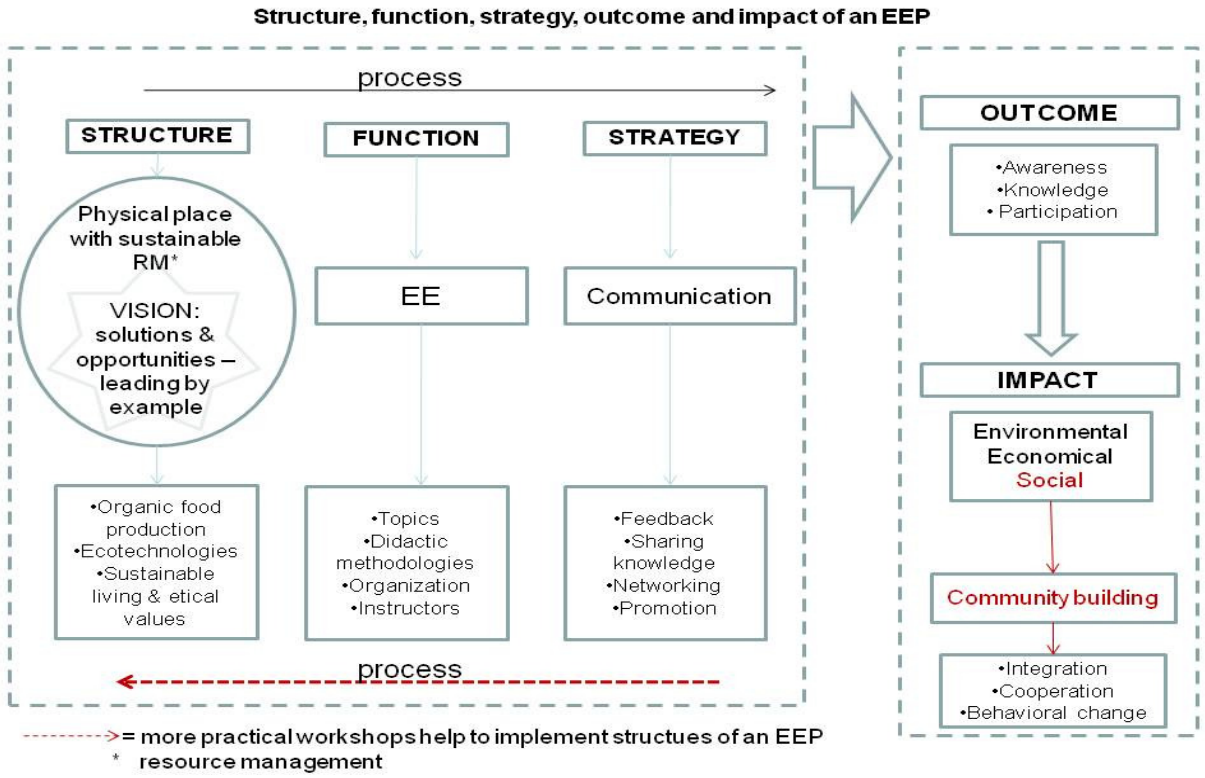


Figure 36: Structure, function, strategy, outcome and impact of an EEP

There are more strategies, outcomes and impacts of an EEP such as outlined by the participants of the survey (see 4.2.2. general and personal gains) but this model refers to the main findings of this research.

The structure of an EEP relates to a physical place with sustainable resource management and the practical implementation of solutions, sustainable living and ethical values. The implementation of sustainable living offers a vision of how change can look like. This vision is highly important for an EEP (see chapter 2, Muñoz, 2002 and Mayer, 2006) as it encourages the translation of public awareness into behavioral change by promoting solution strategies to the participants and visitors. Leading by example defines values of an EEP and supports its credibility. It implements creative solutions, also on the small scale (see table above: simple things) and visions a positive future with alternatives and possibilities.

The main function of an EEP is EE and is defined by strategies of topic choice, didactic (and pedagogical) methodologies, organization (time management) and expert input (competences). As seen in chapter four, the analyzed projects increasingly consider topics such as healthy living, intercultural understanding, sustainable production and consumption as recommended by the Decade of Education for Sustainable Development (see SEMARNAT, 2010).

The here emphasized strategy is communication, focusing on feedback, sharing knowledge, networking and promotion in order to enhance community building, active participation and integration of diverse stakeholders from the community. Most selected projects start the process of implementing an EEP by first establishing the structure and to then develop its function and strategy. A highly interesting approach is to start an EEP by first focusing on communication strategies and EE courses in order to implement the structure of the project (as shown in the figure by the dotted arrow and implemented by Gaia Sana, Tierra Respira and Trabajando con la Tierra). This is increasingly practiced – practical workshops of construction and farming invite participants to be a part of the practical solution by contributing their time and labor in exchange for capacity building. It represents a collective construction of an EEP and enhances the projects legitimacy within society as recommended by Muñoz (2002). Yet, in order to achieve development of an EEP, efficient strategies for communication and EE are essential (and still need improvement when considering the case study of SLP). Based on the efficient implementation of structure, function and strategy, EEIs might create specific outcomes such as

environmental knowledge and awareness; and social, ecological and environmental impact. The observed social impact of the analyzed project refers to community building defined by integration, cooperation and networking.

4.6.2. STAKEHOLDERS AND EEPS

- Based on the results of this analysis the stakeholders for an EEP are different target groups of the local and wider community:

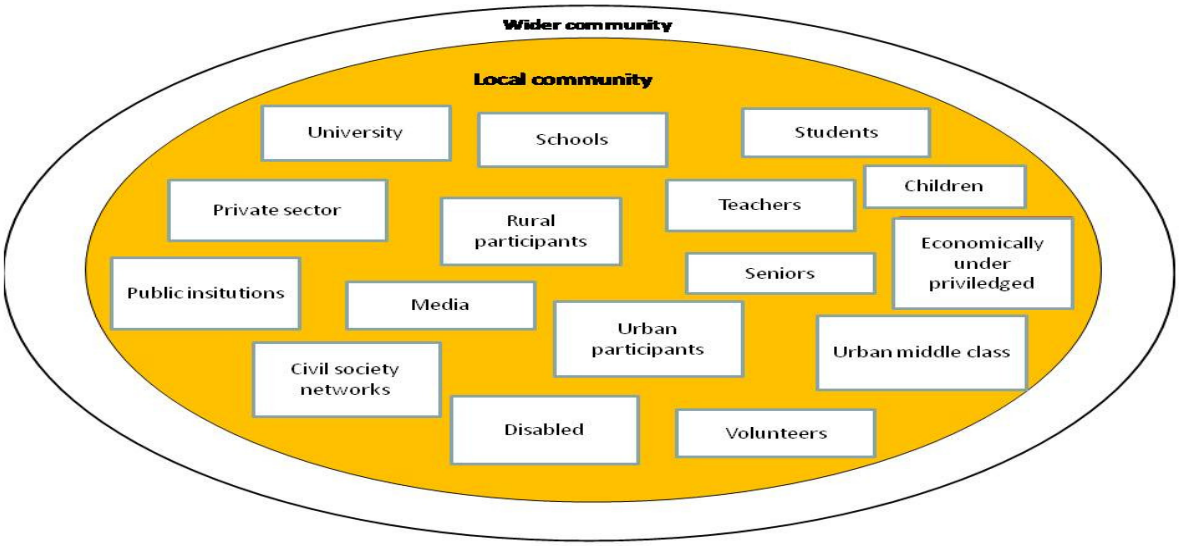


Figure 37: EEPs and stakeholders

An EEP usually works with specific target groups (see Model 1 a). To improve the impact of an EEP and to encourage community building between the different target groups it is recommended to work with a variety of target groups seeking diversity and integration (see Model 1b, figure 38). The EEP should try to reach as many different target groups in order to be more diverse, integrated and influential on the local scale; working with all kind of different target groups and creating community building between the different stakeholders of the community. This can be achieved with efficient communication and promotion strategies (as outlined above) and with selected course offers.

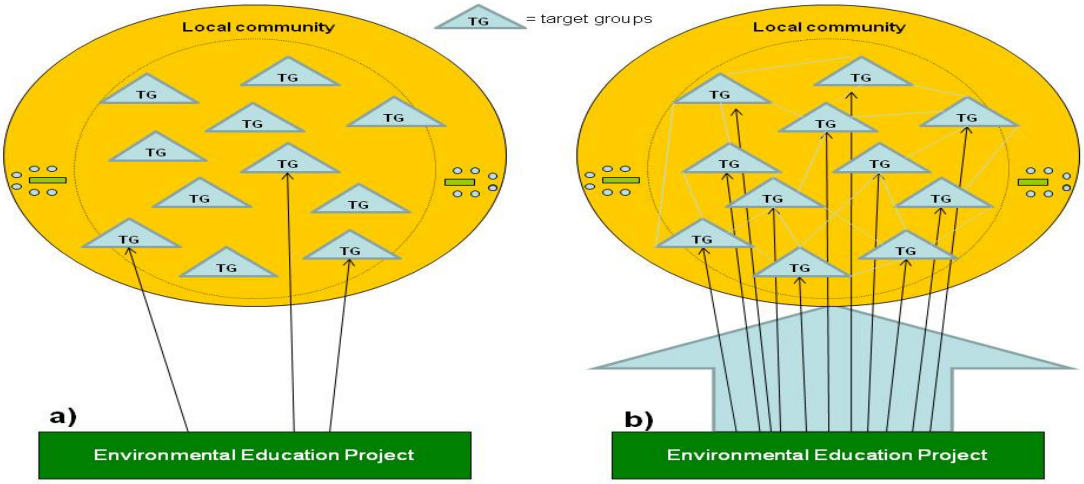


Figure 38: MODEL 1_EEPs and stakeholders_Diversity and integration

4.6.3. COMMUNITY BUILDING CONCEPT

- Taking into account key findings of this investigation it can be argued that EEPs can achieve an impact on different community levels:

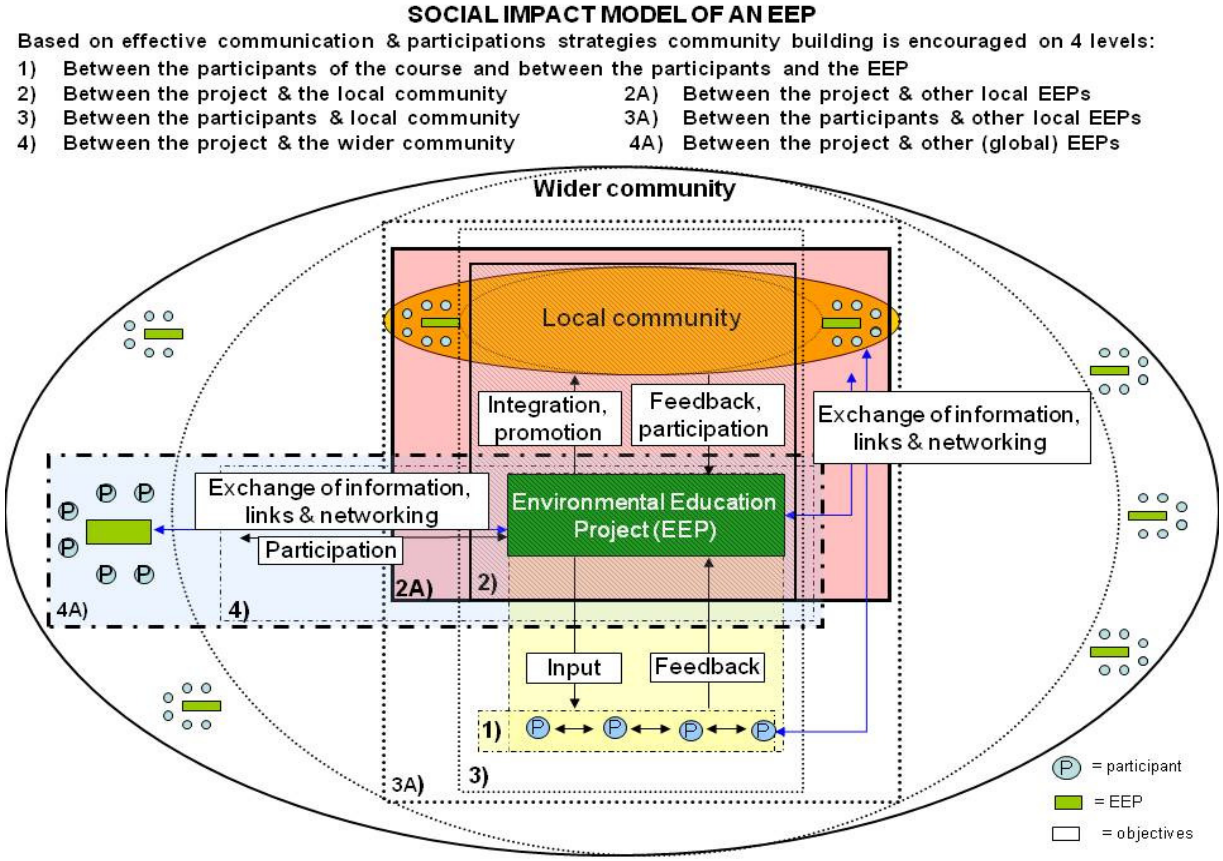


Figure 39: MODEL 2_Social impact of an EEP

In order to understand this fairly complex model within its different spheres, the various levels are explained with outlining specific strategies of communication and participation which encourage the different levels of community building.

The first level of community building which an EEP might generate (see Figure 39) is between the participants of the course, and between the EEP and the participants. Methodologies applied by Tierramor, for example, focus on practical workshops, academic sessions, documentaries, group dynamics and incorporating participant´s experiences in order to encourage integrated learning and community building. Dances and games such as the art of listening (Tierramor) and a camp fire with music and artistic performances (Las Cañadas) support community building within the group of participants. Additionally, active feedback and exchange of thoughts and opinions contribute to the communication between the participants, taking into account new ideas, critical viewpoints, accepting diverse interpretations and concepts. Objectives, concerns and visions are discussed which create some feeling of belonging and support. At the same time, the EEP benefits from the feedback taking into account the participants comments and contributions. Personal contribution might include assistance with activities or installations and volunteering.

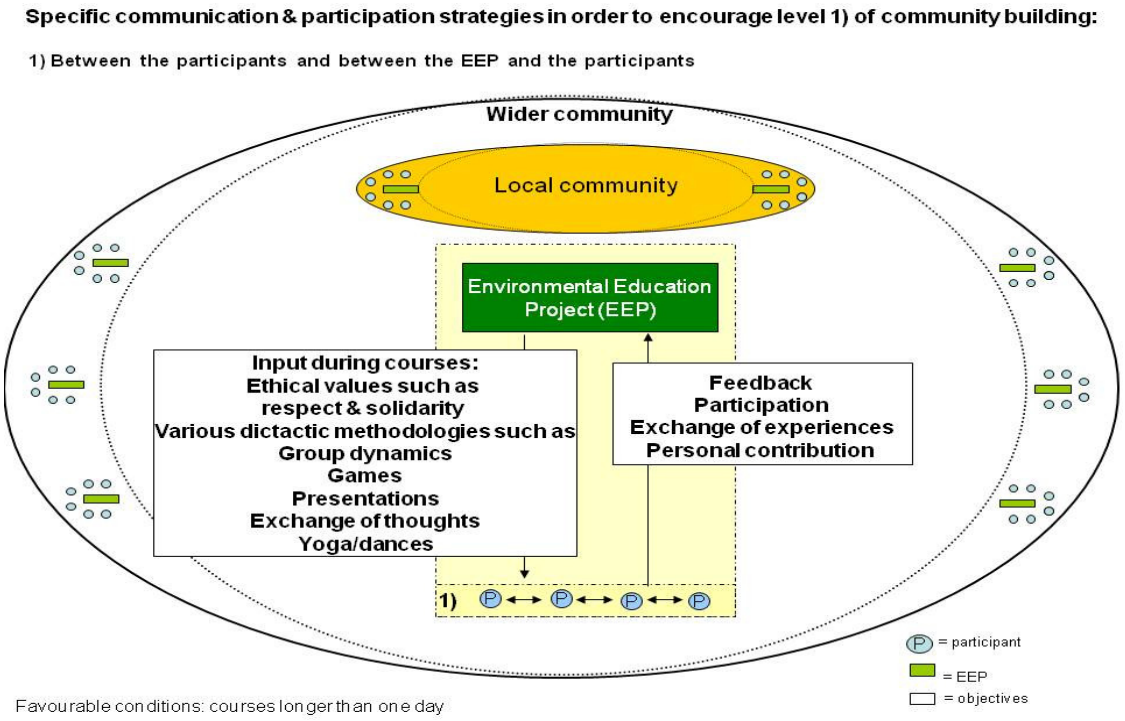


Figure 40: MODEL 3_Community building level 1

Level 2 of community building refers to the relations between the project and the local community and is enhanced by the outlined strategies such as visits, talks, interaction, exchange, promotion, investigation and integration. The EEP aims to develop links, contact and participation with the local community, taking into account the different target groups. It seeks to integrate, to investigate and to interest. Level 2a) refers to the networking and cooperation with other local EEPs, which should be sought in order to know what other EEIs exist, with what objectives and with what success. Thus, EEPs should "facilitate networking, linkages, exchange and interaction among stakeholders in ESD" (see Wals, 2009:8). Instead of competition there should be a cooperation, mutual support and exchange of information. The inclusion, acknowledgement and support of other EEPs or ecological movements strengthen links, networks, cooperation and impact and have also been emphasized by SEMARNAT (2010). This study has highlighted that many of the analyzed projects concentrate on level 2b) in order to increase their impact. Rancho Acayali for example does have links with the local community but concentrates on specific target groups (e.g. people interested in capacity building) This is based on the fact that this project does not primarily focus on EE; and due to time constraints he has not tried to involve as many target groups but rather focuses on links with other EEPs (level 2b).

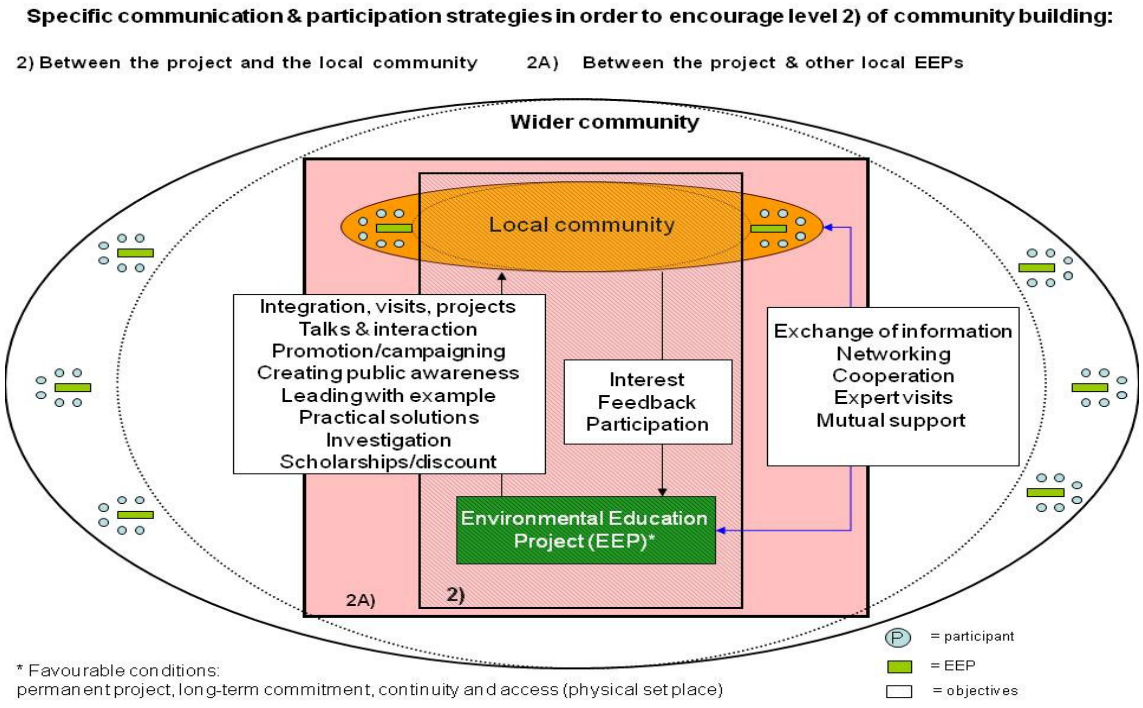


Figure 41: MODEL 4_Community building level 2

Level 3 of community building relates to the participants of the course and the local community. Through engagement such as visits and meetings the EEP facilitates the contact with the local community which responds with feedback and participation. Tierramor, for example, works with several stakeholders from the local community and invites them to be part of the EEP. In this way stakeholders from the local community engage with the participants of the course, sharing knowledge and offering information on biodiversity of the region, agricultural practices or activities such as dance classes. Level 3A) also includes contact and linkages to other EEPs and movements – showing the participants what other ecological movements and efforts can be found in the area and region. This creates awareness and interest and promotes other alternatives of sustainable living. It offers the participant the opportunity to explore different concepts of EEPs and it supports a certain recognition and integration of other EEIs of the local community.

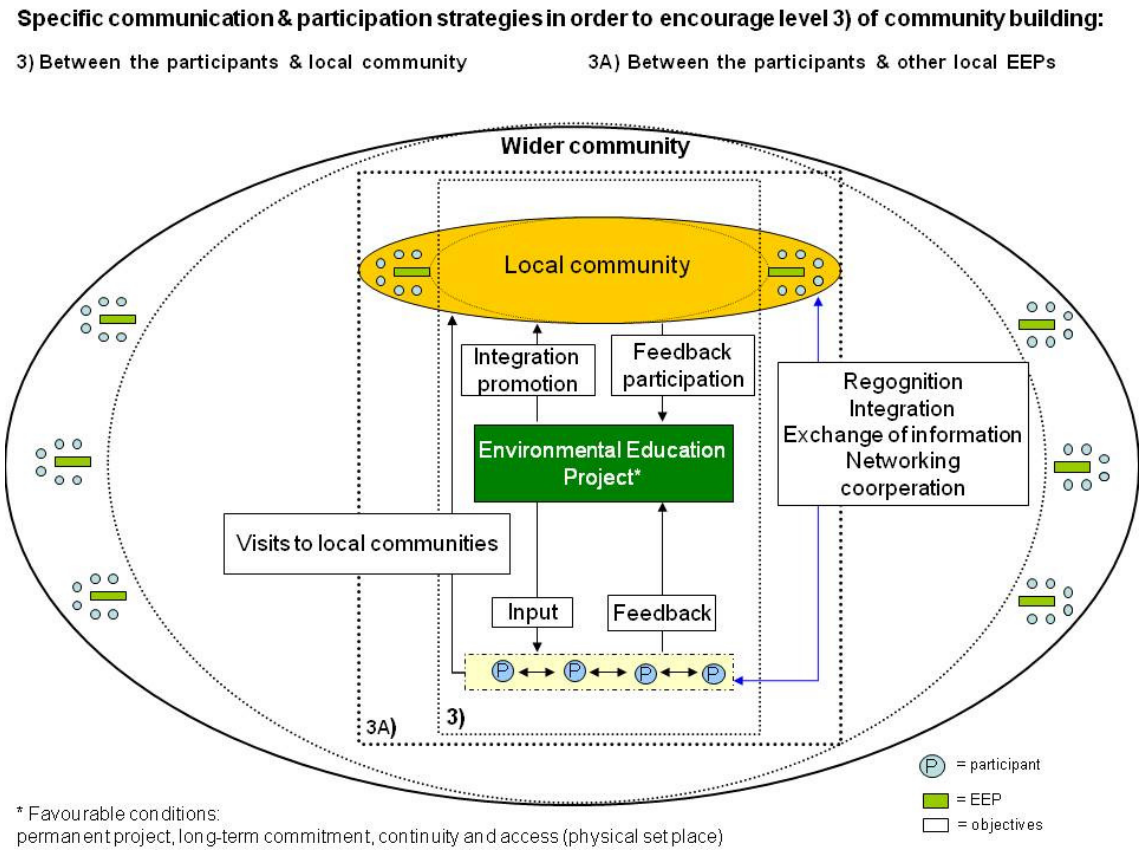


Figure 42: MODEL 5_Community building level 3

Level 4 of community building refers to the impact of the EEP within the wider community. For example, an efficient internet website with regular updates and access to information and material relating to sustainable living attracts the interest of stakeholders also outside the local community. Las Cañadas and Tierramor both work with international volunteers and participants come from all over Mexico due to their good reputation, recommendations and communication strategies (level 4). Also, the promotion and networking with other EEPs encourages active interaction and mutual support. It also creates awareness about other ecological initiatives and their solution approaches and experts from the wider community might be invited to the EEP or the wider community invites the EEP experts. This level of community building is one of the last stages which are usually achieved as it requires long-term commitment, efficient communication strategies, recognition and good reputation. Without doubt, an EEP can directly concentrate upon creating strong links and relationships with the wider community from the start – but it seems somehow necessary to have good links with the local community first.

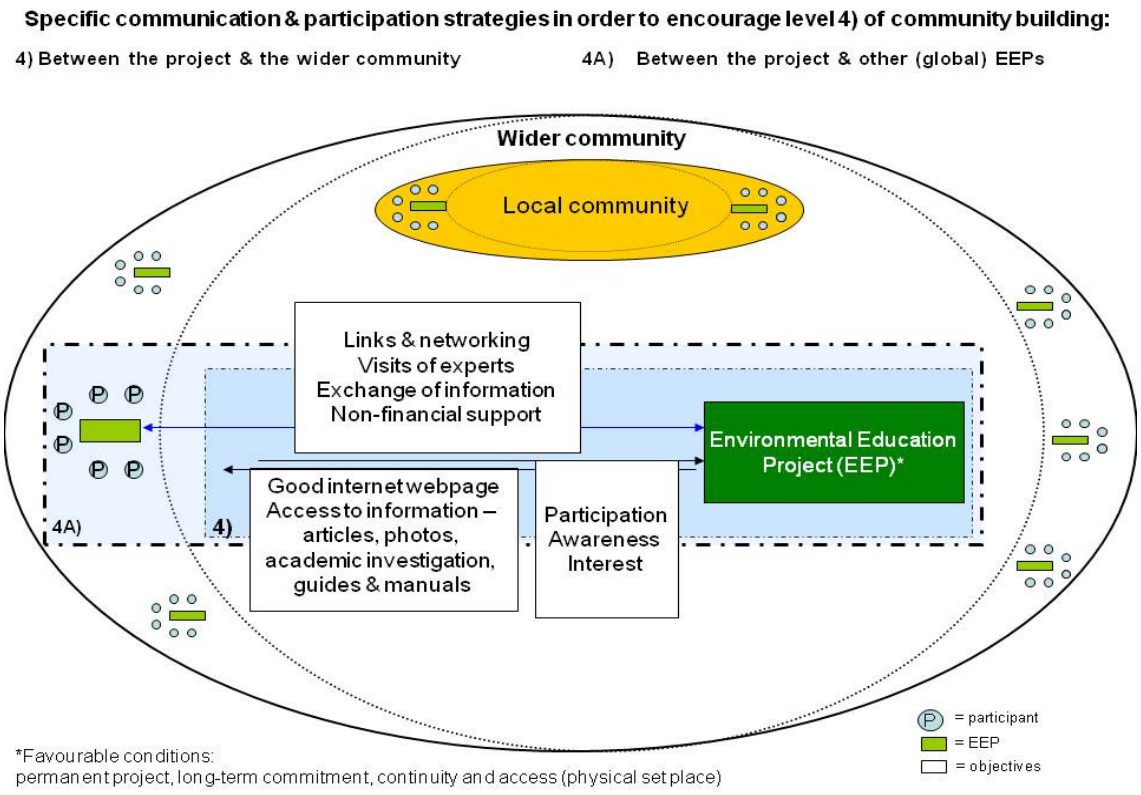


Figure 43: MODEL 6_Community building level 4

4.7. IMPROVING IMPACT OF EEPS, CASE STUDY SAN LUIS POTOSI

4.7.1. COMMUNITY BUILDING CONCEPT FOR SAN LUIS POTOSI

After showing what impact an EEP might have within community building structures the following section analyses how this model can be applied for the case study SLP. It highlights current efforts within the development and management of EEPs but also emphasizes challenges and weaknesses. Figure 43 takes into account the different levels of community building which have been discussed in the previous sections with the help of conceptual maps and analyzes those for the case study of SLP. It indicates which mechanisms in terms of coordination and communication should be improved and extended in order to implement the objectives of the environmental law for the state of SLP and achieve participation and cooperation of authorities, the social and the private sector, individuals and social groups in environmental projects (see SEMARNAT, 2006).

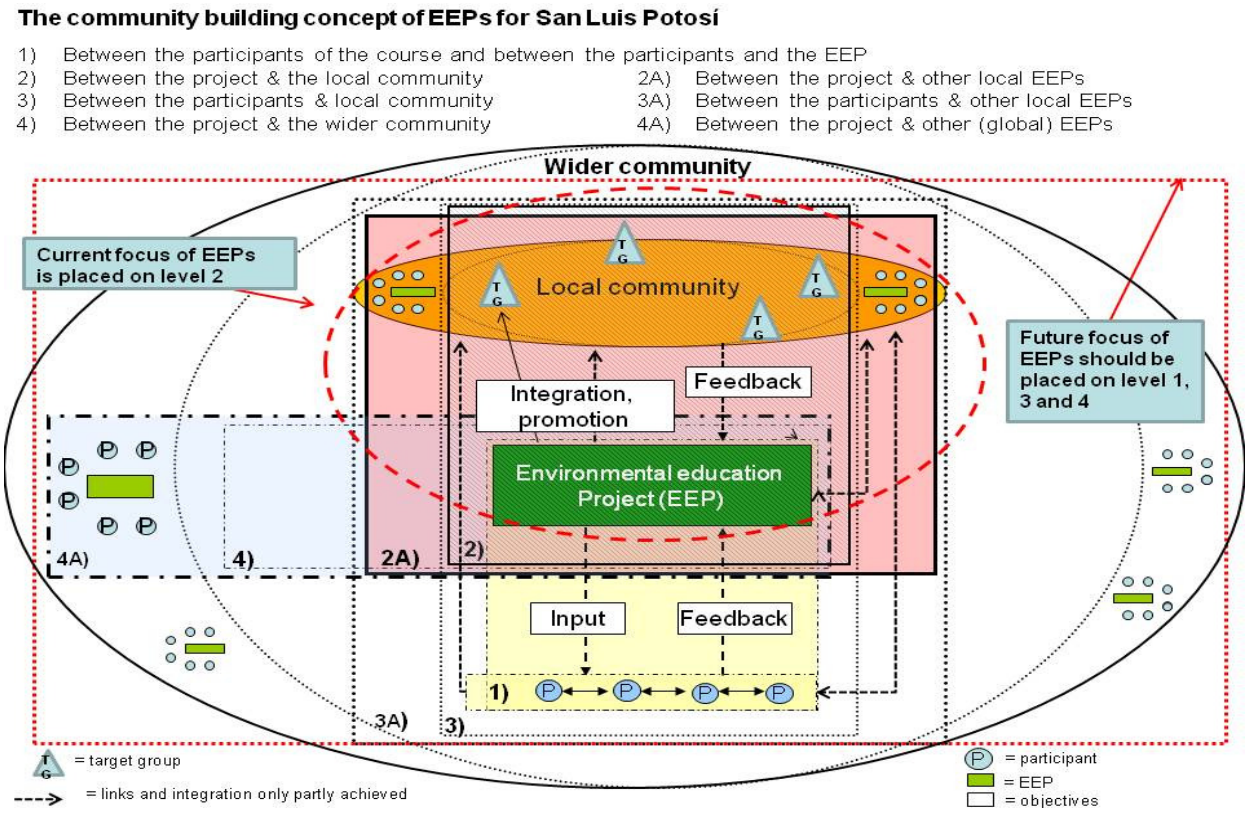


Figure 44: MODEL 7_Social impacts of EEPs in SLP

Community building level 1: between the participants of the course

In general, there is a shortage of EE capacity building courses in SLP. EE capacity building for teachers as recommended by SEMARNAT (2006), for example, are rare and so are regular meetings and conferences focusing on the participation of different target groups. Only the collective Vida Sobre Ruedas is actively promoting communitarian action based on collective identification (see Muñoz, 2002) by inviting different groups of stakeholders to its weekly nocturnal bicycle tour.

There are some irregular capacity building initiatives (e.g. Trabajando con la Tierra, Tierra Respira, Bioespacio) but the promotion of those is often limited to a small group of stakeholders. Thus, there should be more diffusion and communication in order to attract a wider audience to the courses. Additionally further continuity and regularity of courses is recommended. This would enhance community building between the EEP and the participants.

Also important in this context is the missing structure (as discussed in 5.2.) of EEPs in SLP which means that a project rarely represents the values it aims to communicate (exception is Casa Alcyed, which promotes 100% recycled furniture within its home) due to the shortage of permanent installations and real life applications. Most EEPs in SLP do not facilitate a well established structure which focuses on the practical implementation of sustainable resource management. There is a shortage of projects which feature a physical place with easy access for the urban population of SLP and with regular EE capacity building courses. This confirms the necessity, outlined by SEMARNAT (2006), of creating a physical place in SLP for the development, coordination and communication of EE capacity building initiatives targeting different stakeholders of SLP.

It should be noted that the few EE courses in SLP are offered at little or no cost for the participants. On the one hand it offers the opportunity to learn and participate for almost anyone (regardless of economical income) yet on the other hand, slightly higher costs (recommended is a discount system) would generate a modest income for the project, enhancing financial sustainability, more structure, continuity, regularity and professionalism.

Community building level 2: between the project and the local community

EEPs in SLP target certain audiences (students, teachers) of the local community and usually focus on one target group, thus the impact of existing EEPs is rather limited and might be only

noticed by the target group and the EEP. Trying to include and mix different stakeholder groups increases networking and community building between the different target groups and widens the impact of the EEP. Currently the EEIs in SLP function as depicted in model 1a) see figure 37). Projects work with specific target groups – but little is known about them as they interact little with other target groups of the community – so its knowledge and success is usually confined to a certain group of stakeholders. Therefore, the EEPs should focus on the implementation of model 1b) (see Figure 37), aiming to link and connect the different target groups. The improvement of communication – and promotion strategies of EEPs in San Luis Potosí is fundamental (see also SEMARNAT, 2006) in order to achieve higher participation and impact. As analyzed in chapter 4, communication and promotion strategies of the existing EEIs in SLP are so far rather poorly developed and focus on the new social networks (media web 2.0). This is one way of digitally providing information about the EEI and establishing a network but it requires the user to know the name of the EEP and often requires direct communication with the community of SLP in order to find out which projects currently exist. Also, even though most EEPs use media web 2.0, they do not provide information relating to upcoming courses or activities – this indicates a lack of planning and structure, and EE activities are rather spontaneously promoted.

Community building level 2A: between the project and other local EEPs

There are certain linkages between the projects in SLP and some have begun to actually work together (e.g. Reco and Casa ALCYED). There is the recognition of common goals and objectives (Tierra Respira and Trabajando con la Tierra) and mutual acknowledgement is promoted via links on the projects´ Facebook sites. Nevertheless, it is more an awareness and acknowledgement of similar existing EE efforts rather than networking or sharing knowledge as every project is barely identifying own objectives and methodologies.

Community building level 3: between the participants and local community, and between the participants and other local EEPs

There is a limited impact within level 3 due to the shortage of regular EE events, activities and capacity building. Furthermore, links to the local community usually focus on a small group of stakeholders. There is no information available to what extend the participants of EE capacity courses in SLP also establish links to other local EEPs.

Community building level 4: between the projects and the wider community, and between the projects and other (global) EEPs

Links with the wider community are minimal or non-existent. As analysed before, communication strategies barely reach the wider community. Web sites of EEPs, in comparison with media web 2.0 applications, are more efficient as they are easier to be allocated by the research machines such as Google and may additionally attract the interest of stakeholders from the wider community by offering relevant material, studies and publications. A good idea would be a jointed website, listing all the EEIs in SLP, to raise environmental consciousness and awareness about ongoing projects and activities in SLP. This could be implemented by the project Mundo Verde San Luis Potosí as its objective is the active virtual exchange of information relating to sustainable development and EE in SLP. More focus should be placed on establishing networks and cooperation with other EEPs outside the local community, initiating expert visits, mutual support, exchange of knowledge and experiences.

4.7.2. Further Recommendations for San Luis Potosi

- EEPs in SLP can increase their impact by further developing and improving existing communication and promotion strategies.
- EEPs should aim to implement more structure to their project by creating a permanent initiative, a physical place with sustainable resource management, defined by continuity, regularity, commitment, interactivity, practical solution approaches and leading by example.
- EEPs should integrate the permaculture concept and apply efficient strategies in terms of sustainable resource management, EE, participation, communication and finance as highlighted by this study.
- Projects should offer regular EE courses and capacity building and aim for integration, diversification and participation of stakeholders, encouraging incorporation of knowledge and experiences of stakeholders and community building.
- The integration of spirituality within an EEP is rarely found and should be incorporated more.
- Projects should define a strategy such as communication, volunteer management or investigation in order to increase their impact.

- EEPs can increase their social impact through community building on different levels by applying efficient communication and participation strategies, integration and diversification of stakeholders, volunteer management and cooperation with and mutual support of other EEPs.
- Recently, many good initiatives have emerged and future monitoring should evaluate process and impact of those. Evaluation efforts of EEPs in SLP are still rare and should be another future objective in order to improve non-formal EE in SLP.
- The implementation of a pilot project, taking into account (permaculture) strategies and concepts developed by this work which would facilitate the practical implementation of the recommendations outlined.

5. CONCLUSIONS

This work has highlighted the strong permaculture influence within the implementation and management of EEPs in Mexico and has shown that EEPs must focus on environmental communication, networking, cooperation and integration. An EEP is further defined by its structure, function and strategy– and is most successful when offering a vision of sustainable change focusing on solutions and opportunities.

5.1. THE PERMACULTURE CONCEPT

- It is an efficient overall strategy for any EEP promoting sustainable change.
- It is a substantial contribution towards the objectives demanded by the advocates of EE and ESD.
- The main strength of a permaculture project is its implemented structure and the representation of sustainable change –it reflects the values it aims to teach.
- Expert networking, sharing knowledge, continuous experimentation and investigation are actively promoted.
- It represents an evolutionary approach, promotes a process of personal sustainable change and the transformation of visions into real actions.
- As in contrast to other (non-permaculture) EEPs, there is an emphasis on spirituality, which promotes a better understanding of and connection with nature, the appreciation of non-material values and healthy living.
- The permaculture design and ethic principles provide a valuable framework for supporting the efficient development and management of an integrated EEP.

5.2. PERMACULTURE EEPS IN MEXICO

- There is a growing number of independent non-formal EEIs which increasingly apply the permaculture concept and use comparable approaches in terms of course topics, cost and volunteer management.

- EE and capacity building strategies of the analysed projects are similar. Topics and methodologies reflect the promotion of sustainable living and integrated learning.
- The EE strategy is defined by topic choice, theoretical-practical workshops, efficient communication, motivated and knowledgeable instructors and various didactic methodologies promoting critical reflection, spirituality and ethical values.
- The sustainable resource management strategy is defined by creative solutions, upcycling, modified consumption patterns, the implementation of ecotechnologies and bioconstructions, and the application of self-sufficient organic farming/food production.
- Defined practices of sustainable resource management of an EEP have been identified as the structure of an EEP. The analysis has shown that particularly the structure of an EEP is highly important as it allows a vision of sustainable change due to practical implementations of solutions.
- Efficient communication and promotion, one of the fundamental pillars of an EEP, enhances community building, holistic learning, integration, diversity, cooperation, mutual support and participation.
- The integration, participation and diversity of stakeholders support community building.
- (International) volunteer engagement (and management) is a valuable strategy for sharing knowledge and community building and is promoted by almost all investigated EEPs.
- Practical workshops, encouraging the exchange of work and capacity building are a recommended strategy for active participation within the development of sustainable structures.
- It has been emphasized that there are many (creative) ways of achieving sustainable financial management of EEPs.
- The most successful implementation of an EEP is defined by the application of all of these strategies combined and has not been achieved by all of the projects as it is a process which requires time and continuous re-evaluation of methodologies and objectives.

5.3. EEPs IN SLP

- Non-formal EE in San Luis Potosi is a recent phenomenon yet a considerable number of EEPs have formed in the last years.
- Most EEPs in SLP focus on environmental awareness, diffusion of ecological knowledge and services such as recycling, and less on interaction encouraging behavioural change and community building.
- There is a shortage of EE capacity building in SLP and EEIs lack continuity, regularity and efficient communication and networking strategies.
- There are few EEPs which provide a structure by implementing sustainable resource management and offering a vision of sustainable change.
- The structure of an EEP is one of the main challenges of EEIs as it usually requires financial investment; nevertheless, it can be a development process supported by the participation of stakeholders encouraged by communication strategies and EE courses. Some of such approaches have been observed for the case study of SLP.
- The permaculture concept is not actively promoted by any of the projects, yet some projects have started to recognize it and seek sustainable change from within the project

5.4. RECOMMENDATIONS: FURTHER STUDIES

- It is recommended to conduct a feasibility study of EEPs which would offer a detailed economical analysis of annually costs and income and facilitate the development of a business plan for future projects.
- Future analysis of EEPs should also include urban EEIs in order to highlight similarities, differences, strengths and challenges in comparison to rural projects.
- The evaluation of EEPs in SLP should be complemented with additional in-depth investigation, applying similar methodology as was used for the analysis of the five case studies in order to analyse implemented structures and strategies in more detail.
- A stakeholder analysis with actors from San Luis Potosi would identify specific interests and possible participation of the population of San Luis Potosi in an integrated EEP.
- Further academic studies on permaculture initiatives.

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APPENDICES

a) Directory of communities, organizations, centres, networks, governmental and international collectives and institutions according to SEMARNAT and CECADESU (2006)

BIOSFERA
Proyecto de Comunidad
Gabriel Guevara 33,
Col. Sta. María, Chetumal
C.P. 77017, Quintana Roo, México
Tel. (983) 833-5890
lleyito@yahoo.com.mx

ECOALDEA GRATITUD
Proyecto de Comunidad
María Ross
Solferino, Quintana Roo, México
mexpando@hotmail.com

GRUPEDSAC
Centro Ceder, Huixquilucan, Estado de México
Instituto Tonantzin Tlalli, Miahuatlán, Oaxaca
Av. de las Fuentes 184, local 517,
Lomas de Tecamachalco,
C.P. 53950 Naucalpan,
Estado de México, México
grupedsac@prodigy.net.mx
www.gupedsac.org
Tels. 5294-4552, 5294-8274
Fax 5294-0985
Talleres: alimentos, agua, energía renovables, bioconstrucción, higiene, economía y salud.

HUEHUECÓYOTL
Comunidad
Apartado postal No.111
Tepoztlán, Morelos,
62520, México
Tels. (739) 395-5021 Andrés
(739) 395-5011 Odin
(739) 395-5077 Giovanni y Kathy
(739) 395-5010 Arquitectura natural, Michel Lewis
giovanni@ecovillage.org
www.huehuecoyotl.net/
Talleres: facilitación y consenso, medicina tradicional y holística, yoga, danza.

IZTAC
Multiversidad
Ashram
Amecameca,
Estado de México, México
Tel. 04455-5419-2848
http://www.iztac.com/
iztac@iztac.com
Talleres: cocina vegetariana, voz, masaje, enzimoterapia, terapia nutricional, canto armónico, renacimiento, musicosofía.

LAS CAÑADAS BOSQUE DE NIEBLA
Comunidad
Apartado postal No. 24,
Huatusco, Veracruz,
C.P. 94100, México
Tel./fax (273) 734-1577
bosquedeniebla@infosel.net.mx
www.bosquedeniebla.com.mx
Talleres: alimentos, bioconstrucción, salud holística, energías renovables, percusiones, ecoturismo, agroecología.

LOS GUAYABOS
Comunidad
Prol. Av. Ángel Leaño 4000
Zapopan, Jalisco, México
Tel./fax (333) 834-3587
info@losguayabos.org
www.losguayabos.org
Actividades: visitas escolares, ecología.

LOS HORCONES
Comunidad
Apartado postal No.372
Hermosillo, Sonora,
C.P. 83000, México
Tel. (622) 214-7219
(662) 263-8308
walden2@terra.com.mx
www.loshorcones.org.mx
Talleres: análisis de la conducta, psicología conductual, economía cooperativa.

MANANTIAL DE LAS FLORES -RANCHO AGUA ESCONDIDA
Centro permacultural
Paseo de las Palmas 23,
Fraccionamiento Veracruz,
Xalapa, Veracruz, México
Tel/Fax: (228) 815-4155
casadestal@hotmail.com
www.manantialdelasflores.com
Ofrece: productos orgánicos, cosméticos, cursos de salud, agricultura orgánica, crianza agroecológica de gallinas.

NIERIKA
Centro de Transformación Holística, Comunidad
Chalmita, Ocuilan,
Estado de México
Tels./Fax (714) 191-0014
(714) 191-0832
espacionierika@prodigy.net.mx
www.centronierika.net
Talleres: psicología transpersonal, medicina tradicional y holística, yoga integral, meditaciones, alimentos, percusiones, permacultura y ecología.

Continuation on the next page

PROYECTO SAN ISIDRO
Educación Permanente S.C.
Apartado postal No. 15,
Tlaxco, Tlaxcala,
México
Tels. (241) 412-3289
(241) 496-0665
Fax (241) 496-0164
proyectosanisidro@hotmail.com
www.proyectosanisidro.com.mx
Talleres: bioconstrucción, permacultura, ecoturismo, ecología.

PUEBLO SACBE
Comunidad
Av. Constituyentes,
entre Av. 70 y 75
Ejidal Manzana 15, lote 5
Playa del Carmen, Solidaridad, C.P. 77710, Quintana Roo, México
Tel. (984) 206-1296
Fax (984) 206-1831
info@pueblosacbe.com
www.pueblosacbe.com

TEOPANTLI KALPULLI
Comunidad Ecológica/Espiritual
San Isidro Mazatepec,
Jalisco, México
Tel. (333) 630-3614

TIERRAMOR
Educación Ambiental
Erongaricuaro (Pátzcuaro),
Michoacán, México
tierramor@laneta.apc.org
www.tierramor.org
Talleres: permacultura, agua, terapia floral astrológica, cooperación y resolución de conflictos.

TIERRA DEL SOL
Ecoaldea
Tlacochahuayo,
Oaxaca, Mexico
eWxpsnte@prodigy.net.mx
oaxacadriana@yahoo.com.mx
Curso: Permacultura.

YOLITIA
Centro de Sanación
Jalmolonga, Malinalco,
Estado de México, México
Tel. (722) 244-1480
info@yolitia.org
www.yolita.org
Actividades: talleres, medicina integral, ecología.

YOTATIRO
Comunidad productiva
Jenny y Sergio
Yotatiro, Michoacán, México
Tel. (44) 3124-4777
sergixmx@yahoo.com.mx

ORGANIZACIONES Y CENTROS

AYOTL A.C./SISTEMA SOLAR
Centro de Recursos Biorregionale
Circuito Conquistadores 44,
Colonia Amador Salazar,
Yautepec, Morelos, México.
Tel (777) 309-8104
laukur@prodigy.net.mx
Actividades: Educación ambiental y asesoría energética

BICITEKAS
bicitekas@hotmail.com
www.bicitekas.org
Actividad: promueve el uso de transportes sustentables, bicicleta.

CENTRO CULTURAL LA PIRÁMIDE
Cultura Alternativa
Cerrada Pirámide y Calle 24
Col. San Pedro de los Pinos
C.P. 03800 México, D.F.
México
Tel. (55) 3330-0669
lapiramide2000@yahoo.com
www.lapiramide.org.mx
Actividades: teatro, circo, música, danzas, capoeira, ecología, cultura alternativa.

CENTRO DE INVESTIGACIÓN EN ENERGÍA
Fabio Manzini Poli
Priv. Xochicalco, Col. Centro,
Temixco, Morelos,
C.P. 62580, México
Tel. (777) 325-0052, ext. 29704
fmp@cie.unam.mx
www.cie.unam.mx

Continuation on the next page

CITA
Centro de Innovación en Tecnología Alternativa, A.C.
Av. San Diego 501,
Col. Vista Hermosa, C.P. 62290
Cuernavaca, Morelos, México
Tel/Fax (777) 322-8638, 382-1582
cita06@prodigy.net.mx
acua@terra.com.mx
www.laneta.apc.org/esac/citaesp.htm
www.zoomzap.com/ses.php

COLECTIVO ECOLOGISTA JALISCO
Círculo de Consumo y Producción Sustentable
Calle Morelos 2178,
Col. Ladrón Guevara,
Guadalajara, Jalisco, México
Tel (333) 616-8304
cej@cej.org.mx
www.cej.org.mx

DANA, A.C.
La Granja Orgánica
Parque Ecológico Loreto y Peña Pobre
Contacto: Martha Zárate
Tels./fax (55) 5666-7366, 5424-3697
C.P. 14000, México, D.F.
danadc@prodigy.net.mx
Actividades: producción orgánica, capacitación en producción orgánica.

GAIA MÉXICO
Amsterdam 77, interior 303,
Col. Hipódromo Condesa,
México, D.F.
Tel. (55) 8596-4979, 8596-4978
info@gaia.org.mx
www.gaia.org.mx
Actividades: azoteas verdes, work-camps, restauración ambiental.

GIRA A.C.
Centro Interdiciplinario de Tecnología Rural Apropiada, A.C.
Estufas Patsari
Centro comunal el Parián,
interior 17, Col. Morelos, C.P. 61609,
Pátzcuaro, Michoacán, México
Tel (434) 342-3216
giraac@gira.org.mx
www.oikos.unam.mx/gira/principal/gira.htm

GRUPO DE ESTUDIOS AMBIENTALES GEA
Allende 7, Col. Santa Úrsula
C.P. 04650, México, D.F.
Tel. (55) 5619-2892
Tel./Fax (55) 5617-9027
gea@laneta.apc.org
www.laneta.apc.org/gea
Actividades: Manejo campesino de recursos naturales, sistemas alimentarios sustentables.

GUARDIANES DE LOS ÁRBOLES
Flora Guerrero
Cuernavaca, Morelos, México
Tel. (777) 315-1974
Guardianesdelosarboles@prodigy.net.mx
Activistas ambientales.

GYAN MEXICO
Red Global de Acción Juvenil
marioliva@youthlink.org
http://mexico.youthlink.org/mx

IRRI-MEXICO
Instituto Internacional de Recursos Renovables
Álvaro Obregón 110,
Colonia Roma,
C.P. 06700, México, D.F.
Tel. (55) 5264-2187
info@irrimexico.org
www.irrimexico.org
Actividades: Talleres, agua, energías renovables, comunicación ambiental, derecho y legislación ambiental.

JÓVENES CONSTRUCTORES, A.C.
David Calvert, director ejecutivo
jovenesconstructores@prodigy.net.mx

KOMPLEJO KULTURAL
Centro Cultural y Ecológico
Calzada de la Viga 667-A
Barrio San Francisco Xicaltongo
Deleg. Iztacalco, México, D.F.
C.P. 08330
Tel. (55) 2455-5909
www.elkomplejokultural.com

OLLIN AHUEHUETL
Juchipila 22,
Col. El Rodeo Bellavista, CP. 09860
Delg. Iztapalapa, México, D.F.
info@ollinahuehuetl.org.mx
www.ollinahuehuetl.org.mx
Actividades: educación ambiental, consumo responsable, jóvenes y medio ambiente, residuos.

ORGANI-K
Ecología en Acción
Centro Cultural La Pirámide
Cerrada Pirámide y Calle 24
Col. San Pedro de los Pinos
C.P. 03800, México, D.F.
Tel. (55) 5276-1543
info@organi-k.org
www.organi-k.org
Actividades: Talleres, reforestaciones, ecoaldeas, bioregionalismo, agua, residuos, productos orgánicos.

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ORGANIZACIÓN DE EDUACIÓN AMBIENTAL
Vicente Suárez 85, interior 2,
Col. Condesa, C.P. 06140
México, D.F.
Tel. (55) 5553-6100
info@roma-condesa.org
www.romacondesa.org
Actividades: residuos, animales, cultura y arte, ecología.

PABELLÓN VERDE/GREEN ROOM
www.tekio.net/pabellonverde/
pabellonverde@tekio.net
Actividades: redes juveniles y herramientas para la sustentabilidad.

RANCHO AGROECOLÓGICO AGUA ESCONDIDA
Productos y Ecotienda Manantial de las Flores
Paseo de las Palmas 23,
Xalapa, Veracruz, México
Tel. (228) 815-4155
mananflo@hotmail.com

RANCHO RENOVACIÓN
Arturo y Marcela
Acayucán, Veracruz, México
ranchorenovacion@hotmail.com
Producto orgánicos.

RED BIOPLANETA
Av. del Parque 22, Tlacopac,
San Ángel, C.P. 01049,
México, D.F.
Tels. (55) 5661-6156, 5661-6170,
5661-2514, 5661-2061
comentarios@bioplaneta.com
www.bioplaneta.com
Actividades: producción orgánica, capacitación, ecoturismo

SAN NICOLÁS TOTOLAPAN
Parque Ejidal
Carretera Picacho Ajusco, km. 11.5
Del. Magdalena Contreras
México, D.F
Tels. 5644-1280, 1675-1042
parqeejido@data.net.mx
www.parquesannicolas.com.mx
Actividades: Ecoturismo, campismo, educación ambiental.

SARAR-TEPOZECO
Tepozeco
Avenida 5 de Mayo 56-B
Barrio San Miguel,
Tepoztlán Morelos,
C.P. 62520, México
Tel/Fax: (739) 395-3755
tepozeco@prodigy.net.mx
www.sarar-t.org
Actividades: agua y saneamiento ecológico.

TIERRA VIVA
Colectivo Ecológico Social
Apartado postal No.137-030
C.P. 09291, México, D.F.
contacto@tierraviva.org.mx
www.tierraviva.org.mx
Actividades: Talleres, ecología urbana, permacultura.

XOCHITLA
Parque Ecológico
Carretera Cirunvalación s/n
Tepozotlán, C.P. 54600,
México
Tel. (55) 5899-6600
contact@xochitla.org.mx
www.xochitla.org.mx
Actividades: visitas escolares, restauración ambiental, agua.

REDES Y COLECTIVOS

AMBIENTALISTA
carlosagrb@ambientalista.org.mx
www.ambientalista.org.mx
Actividad: red de ecologistas.

CICEANA
Centro de Información y Comunicación Ambiental de Norte América, A.C.
Av. Progreso 3, P.B., Colonia
del Carmen Coyoacán, México, D.F.
C.P. 04100, México
Tel. (55) 5659-0511
www.ciceana.org.mx

MERCADOS Y TIANGUIS ORGÁNICOS EN MÉXICO
Directorio de productos orgánicos
Universidad Autónoma de Chapingo
CIESTAAM, km. 38.5,
Carretera México-Texcoco.
Apartado Postal No. 90,
C.P. 56230, Chapingo, México.
pvbeto@correo.chapingo.mx
www.chapingo.mx/ciestaam/to/index.htm

RECICLEMOS MÉXICO
info@reciclemos.org.mx
www.reciclemos.org.mx
Actividad: Reciclaje de pilas.

THE GREEN CORNER
Mazatlán 81, Col. Condesa, Méx. D.F.
Tel.(55) 1054-7662
info@thegreencorner.com
www.thegreencorner.com
Actividades: Venta de productos orgánicos, ecología.

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UNIÓN DE GRUPOS AMBIENTALISTAS UGAM
www.union.org.mx
Actividad: red de grupos ambientalistas.

INSTITUCIONES GUBERNAMENTALES

CECADESU
Centro de Educación y Capacitación para el Desarrollo Sustentable
Av. Progreso 3, planta alta,
Col. Del Carmen Coyoacán,
C. P. 04100. México, D.F.
http://cecadesu.semarnat.gob.mx

CORENA
Comisión de Recursos Naturales y Desarrollo Rural del Distrito Federal
www.sma.df.gob.mx/corender
Actividades: reforestación, restauración, ecoturismo, agricultura orgánica, proyectos sustentables.

INSTITUTO NACIONAL DE ECOLOGÍA
Periférico 5000, Col. Insurgentes
Cuicuilco, Delegación Coyoacán,
C.P. 04530, México, D.F.
Tel. (55) 5424-6400

SEDUVI
Secretaría de Desarrollo Urbano y Vivienda del Distrito Federal
San Antonio Abad 32,
Col. Tránsito, C.P. 06840
México, D.F.
Tel. (55) 5130-2100
www.seduvi.df.gob.mx

INSTITUCIONES INTERNACIONALES

GAIA TRUST
www.gaia.org
www.gaiaeducation.org
Dinamarca

GEN EUROPA
Europa, África y Medio Oriente
Contacto: Jonathan Dawson
Findhorn Foundation, The Park
Moray, Forres IV36 3TZ, Scotland
Tel. (44)-0-1309-69244, office
jonathan@gen-europe.org

GEN OCEANÍA Y ASIA
Asia, Australia e Islas del Pacífico
Contacto: Max Lindegger
59 Crystal Waters, 65 Kilcoy Lane
Conondale Qld 4552, Australia
Tel. (617) 5494-4741
Fax (617) 5494-4578
genoa@genoa.org.au

GEN SURESTE DE ASIA
Contacto: Jonggon Duangsri
31 Chiangmai - Lamphun Rd.
Tamboon Watkeat, A. Muang
Chiangmai 50000, Thailand
Tel. (66) 5324-7374, 5324-1504
Fax (66) 5324-1504
info@chiangmaigreen.com

INSTITUTO INTERNACIONAL DE FACILITACIÓN Y CONSENSO
Domingo Díez 1589, Plaza
corporativa 113, Cuernavaca,
Morelos, C.P. 62250, México
Tel (777) 102-2288
email@iifac.org
www.iifac.org

L.A. ECOVILLAGE
117 Bimini Place 221,
Los Ángeles, California, 90004
Estados Unidos de Norteamérica
Tel. (213) 738-1254
crsp@igc.org
www.laecovillage.org

RED DE ECOALDEAS DE LAS AMÉRICAS-ENA
Contacto: Linda Joseph
64001 County Road DD
Moffat, CO 81143 USA
Tel./Fax (719) 256-5003
ena@ecovillage.org
http://ena.ecovillage.org/

RED DE ECOALDEAS DE MESOAMÉRICA
Contacto: Giovanni Ciarlo
y Arnold Ricalde
Apartado postal No.111,
Tepoztlán, Morelos,
C.P. 62520, México
Tel. (739) 395-507-7497
Tel. en el D.F. (55) 5276-1543
Cerrada Pirámide y Calle 24,
Col. San Pedro de los Pinos,
C.P. 03800, México, D.F., México
giovanni@ecovillage.org
despertares222@yahoo.com.mx

RED GLOBAL DE ECOALDEAS
GEN: gen.ecovillage.org

b) Permaculture Design Principles, Mollison (1988)

permaculture Design Principles, Mollison (1988)
1. RELATIVE LOCATION:
Components placed in a system are viewed relatively, not in isolation.
2. FUNCTION RELATIONSHIPS BETWEEN COMPONENTS:
Everything is connected to everything else. Create a web of life.
3. RECOGNIZE FUNCTIONAL RELATIONSHIPS BETWEEN ELEMENTS:
Every function is supported by many elements.
4. RECUNDANCY:
Good design ensures all-important functions can withstand the failure of one or more elements. Design backups.
5. EVERY ELEMENT IS SUPPORTED BY MANY FUNCTIONS:
Each element we include is a system, chosen and placed so that it performs as many functions as possible.
6. LOCAL FOCUS:
"Think globally - Act locally" Grow your own food, cooperate with neighbors. Community efficiency not self-sufficiency.
7. DIVERSITY:
As a general rule, as sustainable systems mature they become increasingly diverse in both space and time. What is important is the complexity of the functional relationships that exist between elements not the number of elements.
8. USE BIOLOGICAL RESOURCES:
We know living things reproduce and build up their availability over time, assisted by their interaction with other compatible elements. Use and reserve biological intelligence.
9. ONE CALORIE IN/ONE CALORIE OUT:
Do not consume or export more biomass than carbon fixed by the solar budget.
10. STOCKING:
Finding the balance of various elements to keep one from overpowering another over time. How much of an element needs to be produced in order to fulfill the need of whole system?
11. STACKING:
Multilevel functions for single element (stacking functions). Multilevel garden design, i.e., trellising, forest garden, vines, groundcovers, etc.
12. SUCCESSION:
Recognize that certain elements prepare the way for systems to support other elements in the future, i.e.: succession planting.
13. USE ON-SITE RESOURCES:
Determine what resources are available and entering the system on their own and maximize their use.
14. EDGE EFFECT:
Ecotones (degrees of edge) are the most diverse and fertile area in a system. Two ecosystems come together to form a third which has more diversity than either of the other two, i.e.: edges of ponds, forests, meadows, currents etc.
15. ENERGY RECYCLING:
Yields from system designed to supply onsite needs and/or needs of local region.
16. SMALL SCALE:
Intensive systems start small and create a system that is manageable and produces a high yield.
17. MAKE LEAST CHANGE FOR GREATEST EFFECT:
The less change generated, the less embedded energy is used to endow the system.

18. PLANTING STRATEGY:
First natives, second proven exotics, third unproven exotics - carefully on small scale with lots of observation.
19. WORK WITH NATURE:
Aiding the natural cycles results in higher yield and less work. A little support goes a long way.
20. APPROPRIATE TECHNOLOGY:
The same principles apply to cooking, lighting, transportation, heating, sewage treatment, water and other utilities.
21. LAW OF RETURN:
Whatever we take, we must return every object must responsibly provide for its replacement.
22. STRESS AND HARMONY:
Stress here may be defined as either prevention of natural function, or of forced function. Harmony may be defined as the integration of chosen and natural functions, and the easy supply of essential needs.
23. THE PROBLEM IS THE SOLUTION:
We are the problem, we are the solution. Turn constraints into resources. Mistakes are tools for learning.
24. THE FIELD OF A SYSTEM IS THEORETICALLY UNLIMITED:
The only limit on the number of uses of a resource possible is the limit of information and imagination of designer.
25. DISPERSAL OF YIELD OVER TIME:
Principal of seven generations. We can use energy to construct these systems, providing that in their lifetime, they store or conserve more energy that we use to construct them or to maintain them thereby building sustainable systems.
26. A POLICY OF RESPONSIBILITY TO RELINQUISH POWER:
The role of successful design is to create a self-managed system.
27. PRINCIPLE OF DISORDER:
Order and harmony produce energy for other uses. Disorder consumes energy to no useful end. Tidiness is maintained disorder. Chaos has form, but is not predictable. The amplification of small fluctuations.
28. ENTROPY:
In complex systems, disorder is an increasing result. Entropy and life force are a stable pair that maintain the universe to infinity.
29. METASTABILITY:
For a complex system to remain stable, there must be small pockets of disorder.
30. ENTELECHY:
Principal of genetic intelligence. i.e. The rose has thorns to protect itself.
31. OBSERVATION:
Protected & thoughtful observation rather than protracted and thoughtless destructive labor.
32. OPPORTUNITY:
We are surrounded by insurmountable opportunities.
33. PATIENCE:
Wait one year: (See #31,Observation, above)
34. GRAVITY:
Hold water and fertility as high (in elevation) on the landscape as possible. Its all downhill from there.