Examples for OSAT
- Open Source Appropriate Technology -
for Development Cooperation

(1) Cooking with retained heat, a giant untapped opportunity

(2) A new fuelwood stove, an example for OSAT-production

(3) Solar cooking, generation of income, overcoming rebound effect

(4) Garden culture, gardening in arid zones against desertification, conservation of biodiversity, prevention of soil salinization

and Proposals for ARTIS-Institutes

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8th Solar Conference of INTERSOL, Salzburg/Austria 27. May 2017
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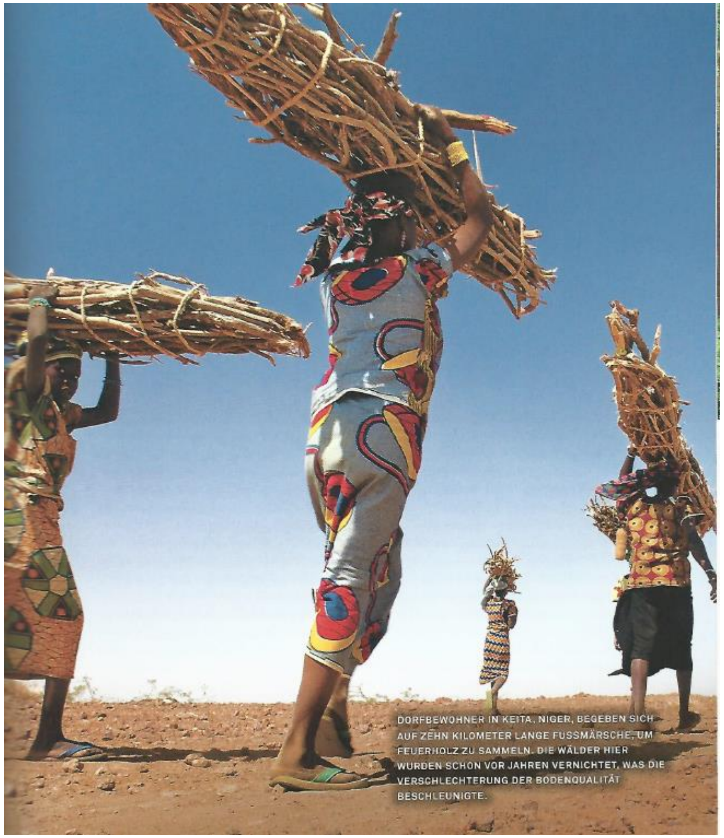
http://solarcooking/Dieter_Seifert

Soil degradation is a major cause of poverty and malnutrition in Africa



"Villagers in Keita, Niger, go on ten-kilometer-long walks to collect firewood. The forests here were destroyed years ago, which accelerated the deterioration of soil quality."

Source; traduced from:
Al Gore: Wir haben die Wahl – Ein Plan zur Lösung der Klimakrise. Riemann, ISBN 978-3-570-50115-3
Orig: Our Choice – A Plan to Solve the Climate Crisis. Rodale, Inc. Emmaus, Pennsylvania

It is to be feared that the women will burn the laboriously procured wood with inefficient stoves, without using the known technology to reduce the fuelwood consumption to about10%.
The remaining demand can be covered by planting of shrubs in the village, for example pigeon peas which are harvested annually and which additionally provide protein rich nutrients and improve the fertility of the soil.

Open Source Appropriate Technology (OSAT)

"OSAT is made up of technologies that are easily and economically utilized from readily available resources by local communities to meet their needs and must meet the boundary conditions set by environmental, cultural, economic, and educational resource constraint of the local community."

Joshua M. Pearce:
The Case for Open Source Appropriate Technology
http://link.springer.com/article/10.1007/s10668-012-9337-9

See also: C. Sinclair: „Open Source Humanitarian Design"
"WORLDCHANGING – A USER'S GUIDE FOR THE 21st CENTURY. Abrams NY, p 216-217)

Practical Action:
"We believe in technology justice" http://practicalaction.org/

Urgency of OSAT

„The urgency is easy to understand: about 2.6 billion people on the planet have no access to save drinking water or hygienic toilets (WHO, 2010), 4 billion people sustain themselves and their families on less than 2 $ per day (UN, 2010), while over 1 billion people are estimated to live in dire poverty surviving on less than 1 $ per day.

Furthermore, approximately 10.8 million children under the age of five die each year from preventable causes (WHO, 2007) , of which access to safe drinking water, proper sanitation and nutrition are the most pressing and most preventable.”

Source: J. Zelenika, J.M. Pearce: Barriers to Appropriate Technology Growth in Sustainable Development.
Journal of Sustainable Development Vol. 4, No. 6; December 2011

Criteria for Perma-Technology
Appropriate Sustainable Technology

1) They improve the living conditions of the population;
2) use only renewable resources (renewable materials, renewable energy) and, if any, only totally recyclable non-renewable resources;
3) do not cause danger when operated under normal conditions;
4) do not cause major danger in case of faulty operation;
5) operate as independently as possible;
6) are easy to use; are fault tolerant, even if operated under sub-optimal conditions;
7) have a long service life and can be repaired easily at low cost;
8) can be adapted to local conditions if necessary;
9) can be developed iteratively if required;
10) they are beautiful.

OSAT Example 1:
Cooking with Retained Heat
(Thermos-Technique)

It is a technique that requires only information, locally available material and diligence.

Saves expenses, smoke exposure, time, and it can save hundreds of million tons of CO_2-emissions.

Cooking with retained heat can reduce e.g. active time for cooking dry beans, lentils, and garbanzos (chickpeas) from some hours to about ½ hour

http://solarcooking.wikia.com/wiki/Heat-retention_cooking

Cooking with Retained Heat a Giant Untapped Opportunity

If 2 billion people annually consume approx. 0.4 tons of firewood per person, and if cooking by retained heat saves 25% or more, then 200 million or more tons of firewood could be saved annually by the extremely simple thermos technology.
As a result, emissions and burdens on health and financial burdens decrease. It is so easy to convey this helpful technique in the classroom and in the media.
It is inconceivable that this opportunity is virtually untapped.

But there are encouraging news:

http://www.reuters.com/article/us-kenya-solar-cooking-idUSKBN17C2KG

J. Wanzala: Kenya learns to cook with solar power – even when the sun doesn't shine

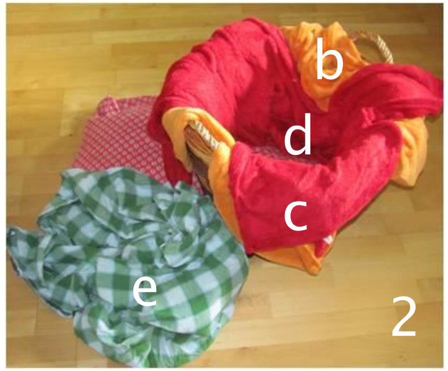
Cooking with Retained Heat

saves expenses, saves health, saves time, saves emissions

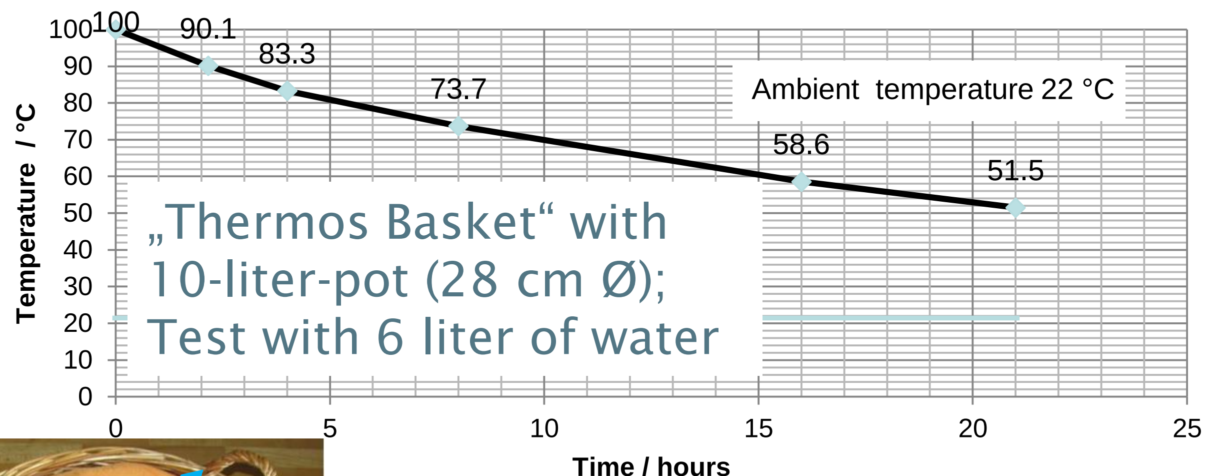
http://solarcooking.wikia.com/wiki/Heat-retention_cooking

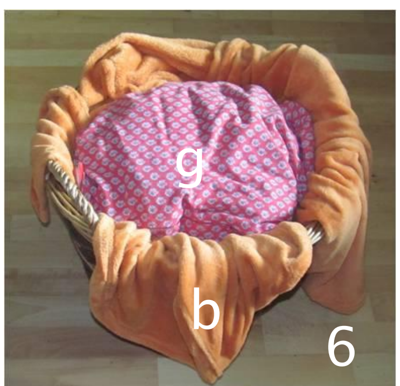
Heat-retention cookers of many different designs built by NAREWAMA
Photo courtesy of Bernhard Müller
(see link above)

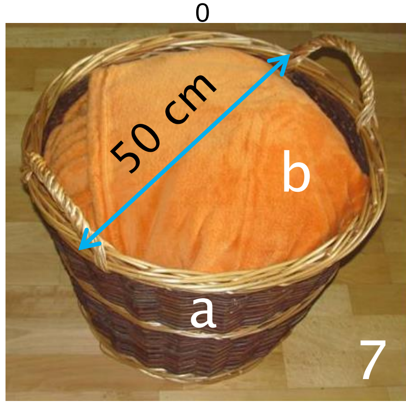
Use of thermos flasks
Photo courtesy of K. Schulte,
Solar Cooker Project
Bamti-Bhandar, Sweden-Nepal



a: basket, b: blanket 1, c: blanket 2, d: cushion beneath pot f,
e: cloth to cover sooted pot f, g: cushion above pot f







It is essential that the insulating material is well dried and that the pot contains a large content. Than the temperature can be kept above 80˚C for hours if the pot is inserted at 100 ˚C (e.g. for cooking beans)

OSAT Example 2: Solar Cooking
an Appropriate Technology

Solar cooking in combination with thermos technology and efficient stoves avoids expenses and diseases, creates jobs and income, protects the environment and the atmosphere.

„The solar cooker appeared sinister to the women at first. However they learned quickly to appreciate the advantages of the non-polluting cooker.“
(N. Richter: „Wunder dauern etwas länger“. Süddeutsche Zeitung, LKR, 30. 4. 1994)

How to overcome the firewood crisis
http://solarcooking.wikia.com/wiki/Dieter_Seifert

Income Generation with the Solar Cooker

Utilization of the SK-Parabolic Solar Cooker for cooking, baking bread and cakes, preservation of fruits and vegetables, for preparing juices and pop corn…

Expenses are avoided and income can be generated due to the variety of applications.

Applications of SK14 and AlSol 1.4 by Imma Seifert

http://solarcooking.wikia.com/wiki/File:Parabolic_solar_cookbook_-_Imma_Seifert.pdf

Boiling Water A Main Task for the Solar Cooker

Selected Results of the 1994 ECSCR Comparative Solar Cooker Test and 1998/99 Tests in South Africa

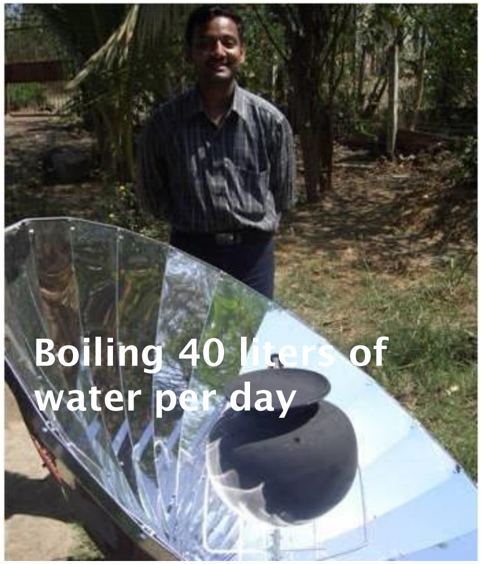
Dimensions (cooking pos.):	143 x 163 x 125 [cm]
Number of pots and nom. volume:	1 removable pot (12 l)
Test pot content:	6 l
Aperture surface:	1.54 m^2 (reflector)
Heating time (water):	
- cold start (40 - 80°C)	*27 minutes/**27 minutes/***30 minutes
- cold start (40 - 96°C)	*44 minutes/**38 minutes/***39 minutes
- hot start (40 – 80°C)	-
- hot start (40 – 96°C)	-
Max. temperature (oil):	*198°C after 130 minutes
Continuous cooking:	*boils 48 l of water in a day
Heat loss with lid open:	*cools from boiling temperature to 83°C in 15 min
Comments:	excellent thermal performance for a concentrator-type cooker; small nominal pot content for this size of aperture; requires regular tracking
Handling:	easy, one-step access to pot; easy tracking, but level ground required; acceptable operation, but difficult to relocate
Application:	cooker for large families and, in modular application, for small institutions; suitable for cooking and roasting
Evaluation for technology transfer/local production:	easily reproducible; reflector material must be protected against corrosion; a folding type of steady stand is under development; transport and assembly require optimization
Contact address:	Dr. D. Seifert, Siedlungsstrasse 12, D-Neuötting, Germany Tel./Fax: +(49)867170413, Email: bdiv.seifert@t-online.de
Legend:	*ECSCR; tested in SA; **European model, *** prototype built in SA

Source: GTZ, Eschborn, 1999

According ECSCR-Test a parabolic solar cooker SK12 (reflector 1.4m) can boil 48 liters of water per day.

At least 4 billion liters of drinking water per day are needed for 2 billion people;
200 million solar cookers are needed.

The Solar Cooker is More Than a Device for Cooking and it Can Avoid the Rebound Effect



"Efficiency increase oftentimes reduces product or service costs, which can in turn ramp up consumption (due to reduced prices), thus partly canceling out the original savings. This is known as the rebound effect."

Source: http://www.umweltbundesamt.de/en/topics/waste-resources/economic-legal-dimensions-of-resource-conservation/rebound-effects

The solar cooker fulfills suppressed demands due to its variety of applications.

It is possible to reduce the traditional fuelwood consumption to less than 1/10 with thermos technology, efficient stoves and solar cookers.

There are further opportunities through biogas technology

Photo:
Deepak Gadhia
and Jagadeeswara Reddy:
„Smokeless Villages“
(biogas and parabolic solar cookers in India)

http://solarcooking.wikia.com/wiki/Deepak_Gadhia

OSAT Example 3: Firewood Stoves Ben 2 and Ben 3

With about 400 grams of dry sticks 6 liters of water can be brought to the boil in less than 30 minutes.

With the Ben-stove workplace the household's expenses for cooking energy can be saved quite completely.

No tree has to be cut for fuelwood or charcoal

http://solarcooking.wikia.com/wiki/Ben_2_and_3_Ben_Firewood_Stoves

http://www.terra.org/categorias/articulos/hornillos-de-lena-ben-2-y-ben-3-de-dieter-seifert

Fuelwood Stoves Ben 2 and Ben 3

Stove consisting of ash pan with grate, tripod, stove shell and shield

Ben 2 for pot diameter up 28 cm
Ben 3 for pot diameter 28 cm and larger
Fuel: dry sticks, small diameter
Net Power: 1.5 kW
Weight: about 4 kg (stove only)
Efficiency: approx. 40%
Little smoke if not overcharged
Material: mild steel
Low cost for local manufacturing

Operation may be more comfortable with the stove positioned on a shelf with appropriate height.

http://solarcooking.wikia.com/wiki/Ben_2_and_Ben_3_Firewood_Stoves

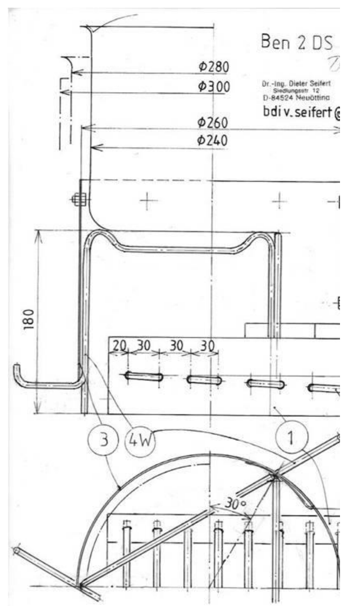
Fuelwood Stoves Ben 2 and Ben 3

are documented in English and Spanish in the internet thanks to Tom Sponheim (SCI) and Jordi Miralles (Fundación Terra)

The documentation includes all information for production and use.
Production in cheap workshops with simple devices is described:

http://solarcooking.wikia.com/wiki/Ben_2_and_3_Ben_Firewood_Stoves

http://www.terra.org/categorias/articulos/hornillos-de-lena-ben-2-y-ben-3-de-dieter-seifert



Ben Stoves can be produced without electrical power in case of need

Three Stone Fireplaces and Traditional Charcoal Cause the Fuelwood Crisis

Comparison of fuelwood consumption

http://solarcooking.wikia.com/wiki/Ben_2_and_3_Ben_Firewood_Stoves

http://www.terra.org/categorias/articulos/hornillos-de-lena-ben-2-y-ben-3-de-dieter-seifert

Tree stone fire consumes approx. 1600 g wood (shown with the left pile) for boiling 6 liters of water (efficiency 10%). The right pile shows an estimated additional consumption if cooking with retained heat is not applied.

Ben-Stove needs approx. 400 g wood (small sticks) for boiling 6 liters of water (efficiency 40%). Cooking with retained heat (e.g. cooking dry beans in Thermo-Basket) is done without fuel consumption.

The parabolic solar cooker reduces additionally the fuelwood consumption and avoids the rebound effect due to its high variety of applications.

Higher savings of wood are possible if traditional charcoal is replaced.

Annual Fuel Consumption of a Household in a Developing Country - Possible Savings

(Compared with traditional three stone fireplace with efficiency of 10%)

Fuel Consumption per Year	Equipment	3-Stones-firewood	Ben 2	Charcoal tradit.	Charcoal improved
	Fuel	Firewood	Firewood	Charcoal	Charcoal
	Unit	**Assumptions**	**03.02.2015**	**Assumptions**	**Assumptions**
Net Energy Demand E_eff per Household per Year	MJ/Year	6.000	6.000	6.000	6.000
a) Fuel Consumption B per Household per Year	kg/Year	4.000	985	1.101	667
Percentage of Saving f_thermo via Thermos Technique		45%	45%	45%	45%
Percentage of Saving f_solar via Solar Technique		45%	45%	45%	45%
b) Fuel Consumption including Thermos Technique	kg/Year	2.200	542	550	367
c) Fuel Consumption including Thermos- and Solar Technique	kg/Year	1.210	298	303	202
Conversion to Fuelwood Consumption per Household per Year:			Short rotation plantation	Thick stems and branches for charcoal	
Mass Ration Wood/Charcoal (IPCC default value)	kg Wood/kg Charcoal			6	6
a) Without Thermos- and Solar Technique	kg Wood/Year	4.000	985	6.005	3.999
b) Including Thermos Technique	kg Wood/Year	2.200	542	3.303	2.200
c) Including Thermos- and Solar Technique	kg Wood/Year	1.210	298	1.816	1.210

Result: The fuelwood consumption per household per year can be reduced from 4000 kg to 300 kg
(Transition from traditional charcoal saves even more!)

Saving of CO_2-Emission

Saving of CO2-Emission from Transition to Ben Stoves, Thermos- and Solar Technique		
Emission Factor EF Wood (IPCC 2006)	kg CO2/MJ	0,112
Net Calorific Value NCV Wood (UNFCCC default value)	MJ/kg Wood	15
Fraction f_nrb of non-renewable biomass		0,85
Saving of CO2-Emission per kg Wood	kg CO2/kg Wood	1,428
Saved Amound or Wood = 4000 kg - 300 kg	kg Wood	3700
Saved CO2-Emission per Household per Year	kg CO2/Year	5280

The reduction of the annual fuelwood consumption
from 4000 kg to approximately 300 kg
corresponds to saving of CO_2 emission of approximately
5 tons per year, if 85% of wood is not harvested sustainably.
This corresponds with about the emission of a car drive from
the length of the equator (40000 km * 0.125 kg CO_2/km)
as a possible saving of each of more than two hundred million
households in fuelwood crisis regions.
In total these would save emission of more than 1 billion tons of CO_2

Factor 16: Transition of a Household from Charcoal to Renewable Biomass

An average household in Lusaka consumes about 1.4 tons of charcoal per year, requiring about 8 tons of wood processed in kilns. The consequences are deforestation and health damage caused by carbon monoxide.

It is possible to reduce the consumption of wood from 8 tons to less than 0.5 tons, that is to 1/16.

Cooking maize porridge with charcoal in Zambia

About the Importance of Dry Forests and Woodlands in Africa

"The dry forests and woodlands of sub-Saharan Africa are major ecosystems, with a broad range of strong economic and cultural incentives for keeping them intact. However unlike tropical rainforests, few people are aware of their importance, despite their status as home to more than half of the continent's population."

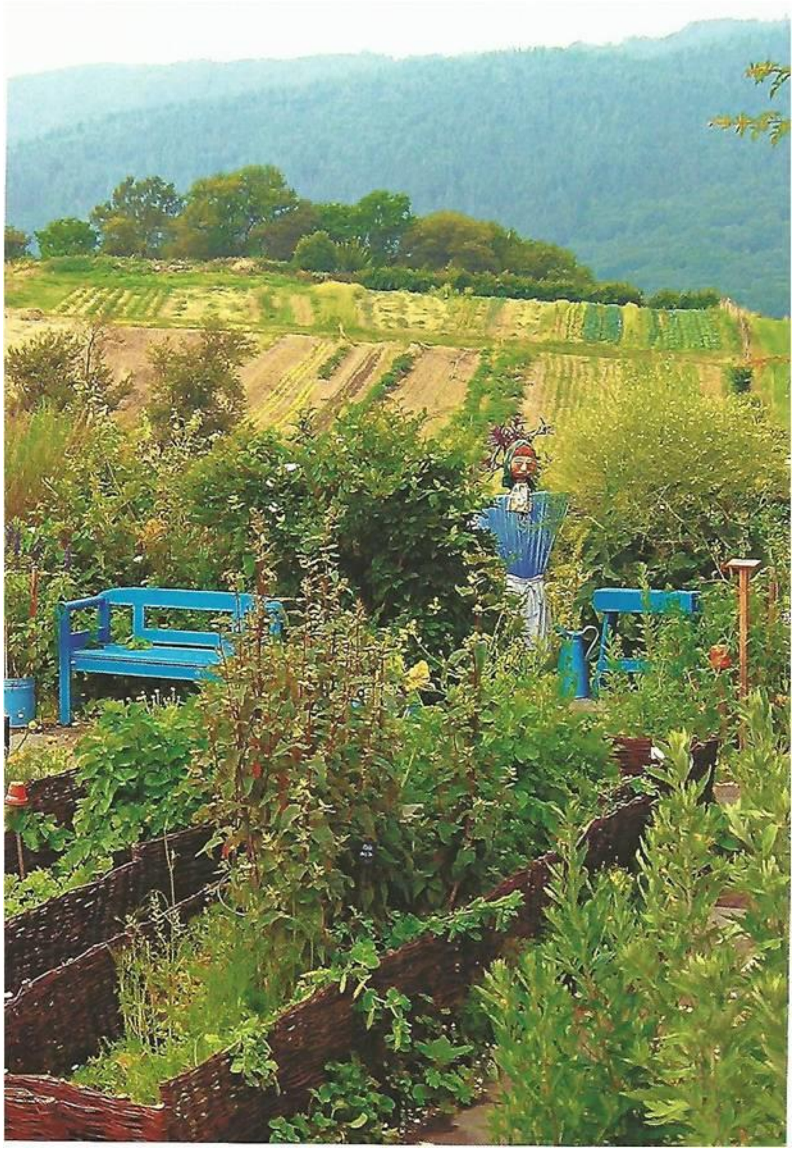
E.N. Chidumayo et al.:
The Dry Forests and Woodlands in Africa.
Earthscan - Publishing for a sustainable future. London, Washington D.C.
(2010)
ISBN 978-1-84971-131-0

OSAT Example 4:
Gardening to Escape from Poverty

Models:
Monastic Gardens, Farmyards,
Historic Gardens (Augsburg),
Private Gardens

Opportunities:
Food Security
Millions of Jobs
Gardens also in Dry Areas
Prevention of Soil Salinization

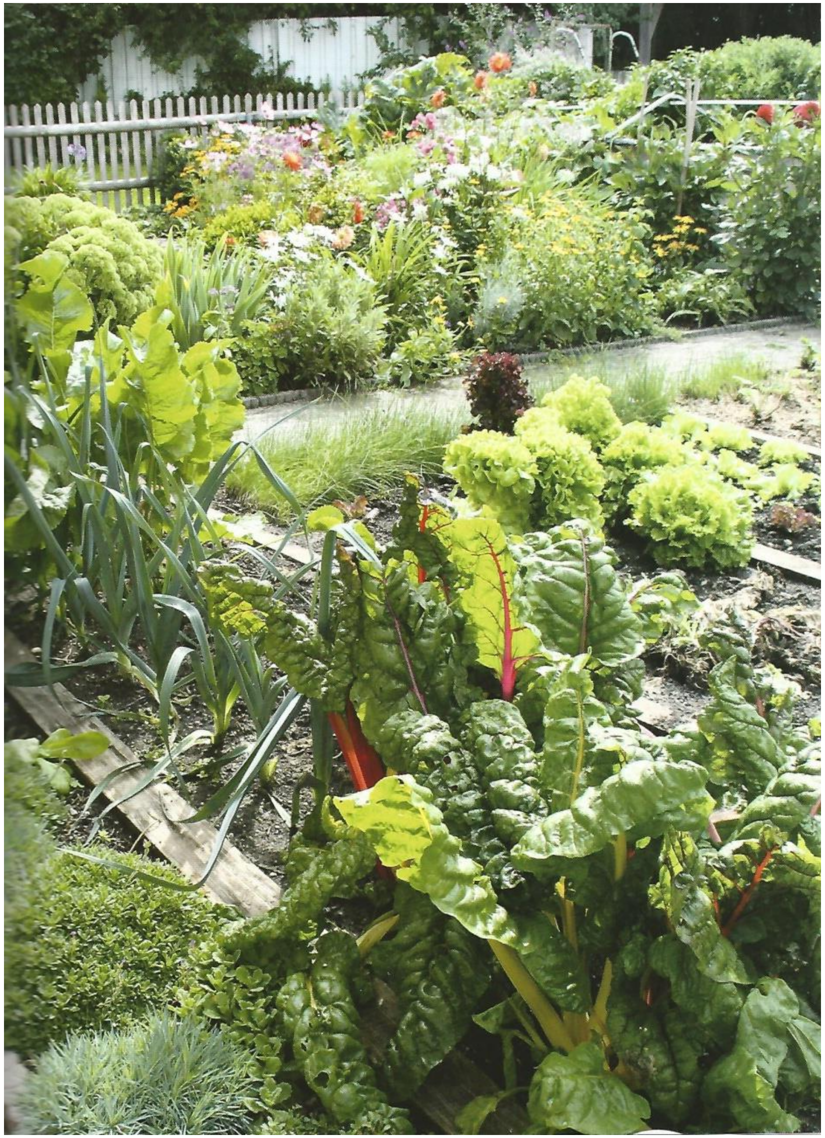
Models: Monastic Gardens



The picture shows gardens on the Waldbreitenbacher Klosterberg over the Wiedtal, as an example of the centuries-old, exemplary monastic gardens tradition.

Source:
M. Kauko, O. Lechner:
Orte der Stille –
Berühmte Klöster und ihre Gärten. (Places of silence – Famous monasteries and their gardens)
Ellert & Richter Verlag (2007)

Models: Farming gardens



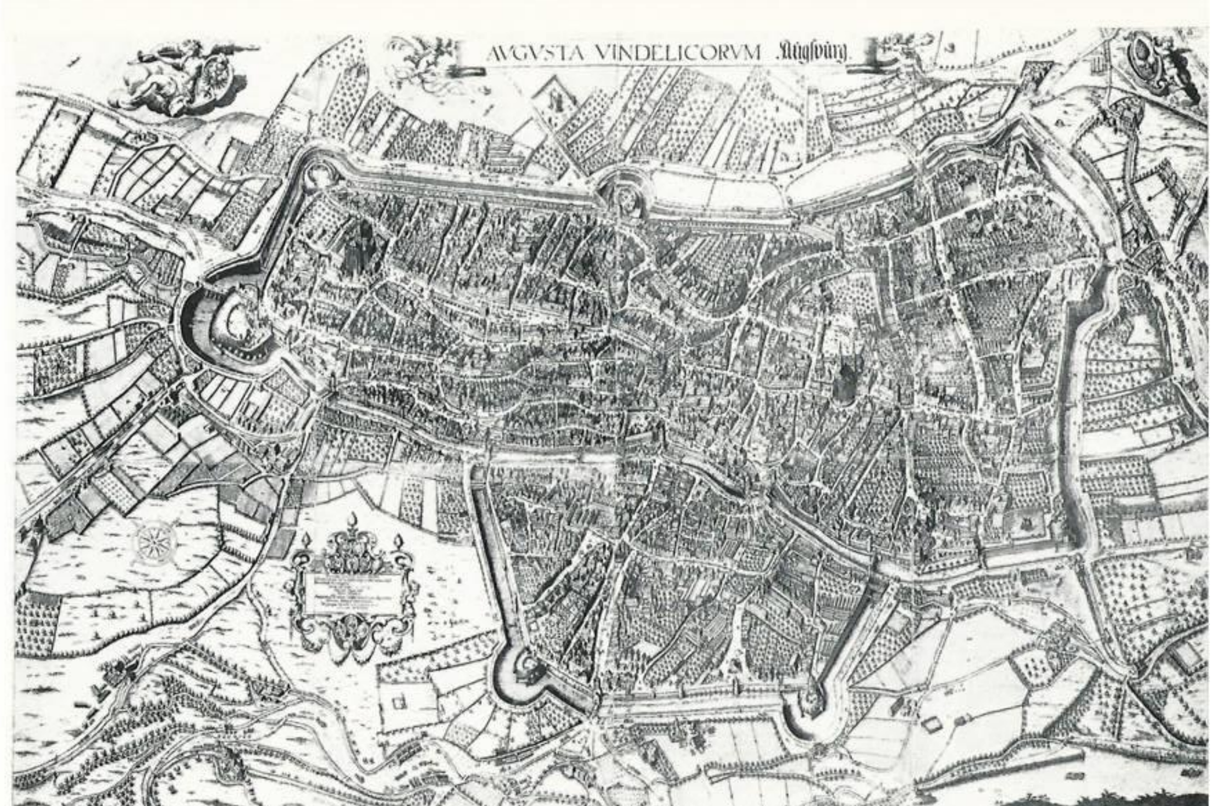
Farming gardens have a long tradition and can be a model, for example for African households in overcoming poverty and helplessness.

Bild: R. Jarczok u. M. Backfischer: Alte Handwerkskunst. Kapitel „Grundversorgung mit Nahrung“ (Old craftsmanship. Chapter "Basic food supply“)
Dort-Hagenhausen-Verlag
www.aus-liebe-zum-landleben.de

Historic Example for City Self-Supply:
Gardens of Augsburg (1626)

"The city plans of Augsburg from the Middle Ages up to the modern era show extensive garden grounds following the city walls outside the fortifications and surprise by large gardens, in some parts also within the walls."

Robert Pfaud: Das Bürgerhaus in Augsburg. (The Citizen House in Augsburg) Verlag Ernst Wasmuth (1976)



Stadtansicht auf Augsburg von Osten nach Westen von Wolfgang Kilian (1626). In der rechten unteren Bildecke der Lech.

City plan of Augsburg – from copper engraving by Wolfgang Kilian from the year 1626

Horticulture and Gardening in Arid Zones to Prevent and Reverse Desertification

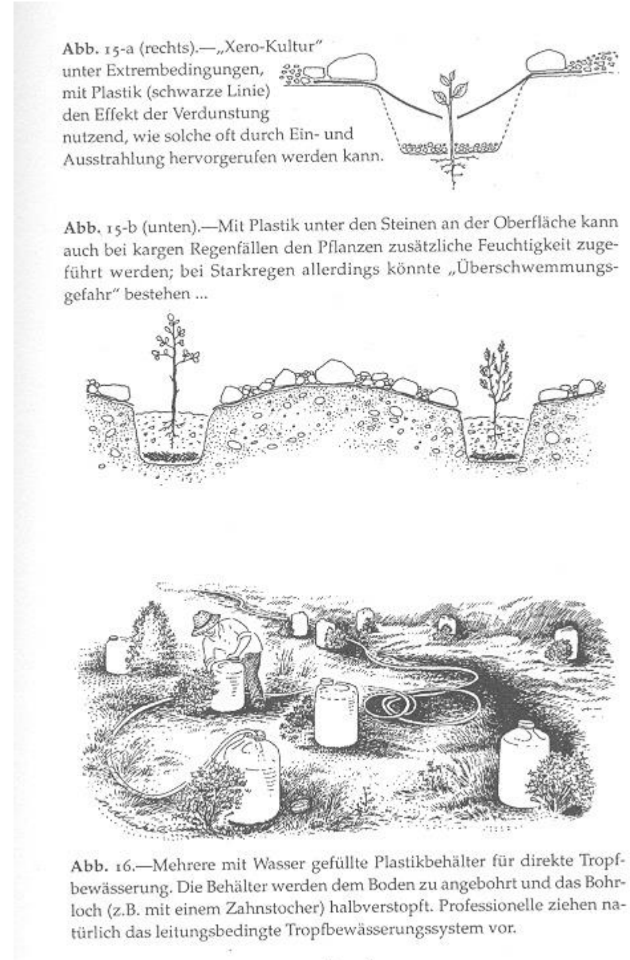


Abb. 15-a (rechts).—„Xero-Kultur" unter Extrembedingungen, mit Plastik (schwarze Linie) den Effekt der Verdunstung nutzend, wie solche oft durch Ein- und Ausstrahlung hervorgerufen werden kann.

Abb. 15-b (unten).—Mit Plastik unter den Steinen an der Oberfläche kann auch bei kargen Regenfällen den Pflanzen zusätzliche Feuchtigkeit zugeführt werden; bei Starkregen allerdings könnte „Überschwemmungsgefahr" bestehen ...

Abb. 16.—Mehrere mit Wasser gefüllte Plastikbehälter für direkte Tropfbewässerung. Die Behälter werden dem Boden zu angebohrt und das Bohrloch (z.B. mit einem Zahnstocher) halbverstopft. Professionelle ziehen natürlich das leitungsbedingte Tropfbewässerungssystem vor.

Günther and Mary Anne Kunkel:
JARDINERÍA EN ZONAS ÁRIDAS (Gardens and Gardening in Dry Areas) ed. Alhulia, Salobreña/Granada
www.lafertilidaddelatierra.com ISBN: 84-95136-43-0

Recommendations** of Günther Kunkel for Gardening in Arid Zones

Günther Kunkel, biologist and author, lived many years in arid regions of the earth and has published scientific books and articles. He realised projects to cultivate arid areas, together with his wife, artist Mary-Anne Kunkel, who illustrated his books.

1. Situate water containers above the area to be cultivated to enable irrigation without pumps
2. Terracing of the area is recommendable when possible and when it avoids environmental damages
3. A cover of stones or grit can reduce losses of water
4. An other possibility to avoid water losses is the use of plastic foils.

(items 5. ... 16. see next two pages)

**given to Imma and Dieter Seifert in an Interview in July 2004 in Vélez Rubio/Spain

(cont.) Recommendations of Günther Kunkel for Gardening in Arid Zones

5. Indigenous plants which can more easily withstand droughts should be preferred.
6. Resistant accompaniment plants should also be fostered to ensure a durable plant cover.
7. The experiments should begin with a multitude of small sectors to gain experience.
8. Fencing is recommendable to protect the vegetation against grazing animals.
9. Dry walls serve as protection against erosion; but care has to be taken for percolation and for overtopping.
10. Walls also protect against drying by the wind.
11. Do your work with caution, avoid levelling and avoid large monoculture.
12. Irrigate at the right time; newer at sunshine. (see next page)

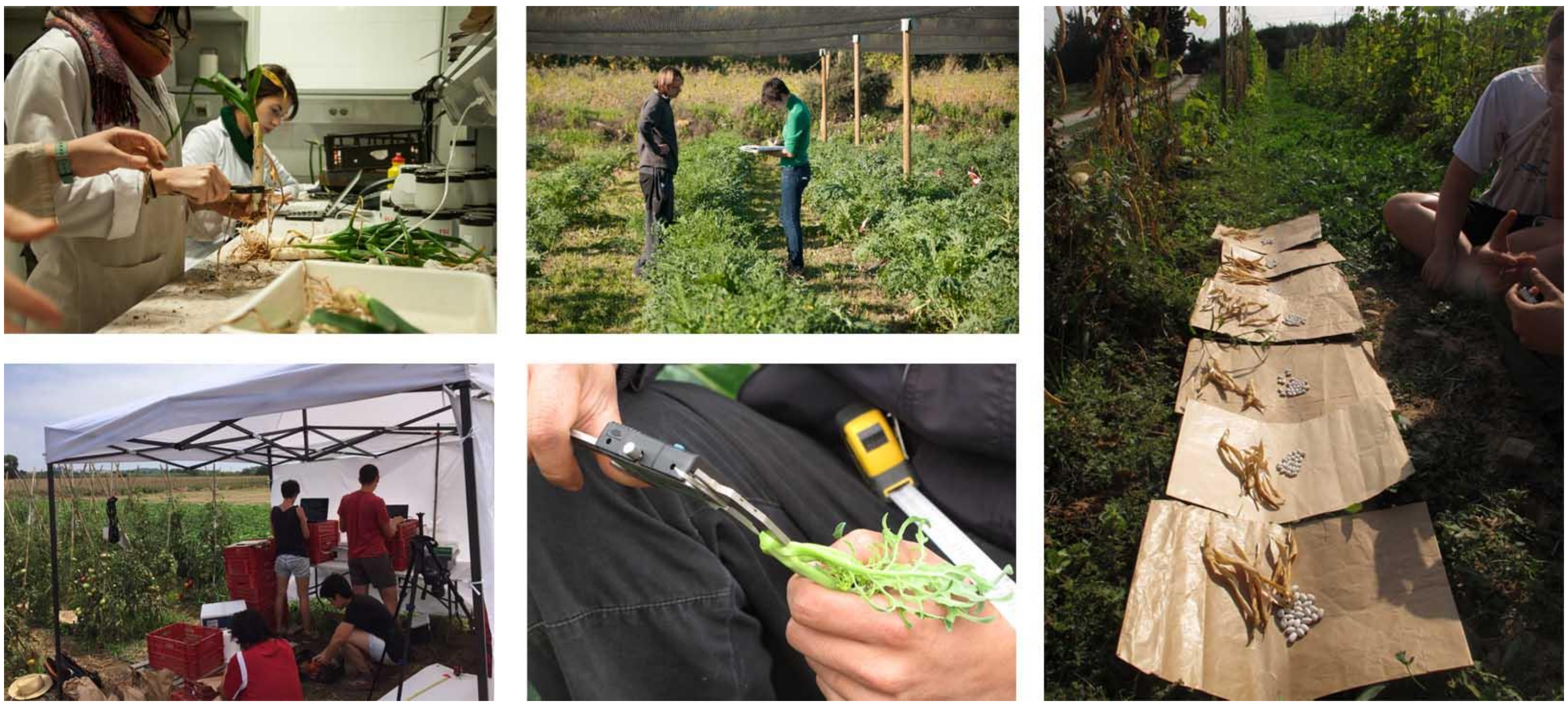
(cont.) Recommendations of Günther Kunkel for Gardening in Arid Zones

13. Irrigation is necessary mainly in the initial phase; drip irrigation has the disadvantage that the formation of roots is weak, so that the transition to the phase without irrigation is delayed.
14. Cultivation has to take in mind the seasonal conditions of the region. E.g. the planting time has to be coordinated with rain season.
15. Specification of water needed cannot be done exactly. There are many factors influencing the necessary amount of water.
16. G. Kunkel recommends contacting experts, e.g. Prof. Dr. H.N. Le Houérou, France, and literature cited in:

G. Kunkel and M.A. Kunkel: Jardinería en Zonas Áridas. Ediciones Alternativas, Almería (1998), ISBN: 84-605-7736-8)

Promoting Garden Culture with Indigenous Agricultural Products

Conservation of Biodiversity



Source: Fundació Miquel Agusti, Barcelona
http://fundaciomiquelagusti.com/es/que-som-2/

Bio-carbon for improving soil quality and as a carbon sink

https://en.wikipedia.org/wiki/Biochar

"The soil of the earth contains, in the few meters below the surface, about three to four times as much carbon as trees and other plants and more than twice as much carbon as present in the atmosphere. "

"With improved agricultural methods and appropriate land use, we can significantly increase the amount of CO_2 removed from the atmosphere by the vegetation and stored in the ground. At the same time, agricultural productivity and food supply would also be improved and leached soils could recover. "

"In West Virginia, a chicken farmer produces Bio-carbon from poultry dung and wood chips - a valuable resource for the enrichment of soils with carbon. "

Source; traduced from: Al Gore: Wir haben die Wahl – Ein Plan zur Lösung der Klimakrise. Riemann, ISBN 978-3-570-50115-3

Private Gardening

a) Households in developing countries often have small gardens to grow their own vegetables and fruits. But this chance in the fight against hunger is not enough deployed so far.

b) Private gardening should be enabled and encouraged also in developing countries for all interested households.

c) Children should learn at school how to cultivate vegetables and fruits in small containers.

d) Public botanical gardens should demonstrate the possibilities and necessities.

e) The access to seeds and seedlings has to be organized with support of the public authorities, possibly in combination with botanic gardens.

Private Gardening (cont.)

f) An important role plays the availability of containers for intensive gardening.

g) It should be investigated if appropriate containers and foils for the gardening and for prevention of soil salinization can be produced from the large quantity of plastic waste (an environmental contamination in many regions and the sea) for a useful and proper recycling.

h) Of course there should also grow flowers in the micro habitat as it has long tradition in kitchen gardens worldwide.

i) We cannot overestimate the opportunities and advantages of gardening. Sustainable civilization needs that we all become gardeners, at least micro-gardeners.

Literature e.g.: John Seymour: The new complete book of self-sufficiency. Dorling Kindersley Ltd.

FAO: How to Feed the World in 2050

"The world has the resources and technology to eradicate hunger and ensure long-term food security for all, in spite of many challenges and risks. It needs to mobilize political will and build the necessary institutions to ensure that key decisions on investment and policies to eradicate hunger are taken and implemented effectively. The time to act is now."

Source: www.fao.org/ How_to_Feed_the_World_in_2050.pdf

Raising Awareness for the Benefits of Pulses (Legumes)
Example: Garbanzos

2016 INTERNATIONAL YEAR OF PULSES

"The 68th UN General Assembly declared 2016 the International Year of Pulses (IYP)"

"The IYP 2016 aims to heighten public awareness of the nutritional benefits of pulses as part of sustainable food production aimed towards food security and nutrition."

Source: FAO fao.org/pulses-2016

Proposal for Promoting OSAT: "African Research and Technology Institutes for Sustainability (ARTIS)"

http://solarcooking.wikia.com/wiki/File:Traditional_Charcoal_in_Africa_and_need_of_African_Institutes_ARTIS.pdf

The proposal starts with a discussion of danger from traditional charcoal business in Africa and its devastating consequences. Alternatives given by OSAT are known, but not in use.

To overcome the helplessness, African institutes for adaption and spreading of OSAT are proposed. These institutes can create perspectives for millions of young African people.

Tasks of ARTIS

The tasks arise from a fundamental question: How can a good prospects and dignified living conditions be created for all people in Africa?
By institutes committed to the common good.

1) Nutrition: Examples: Intensive gardening; Preparation of food without harm; Pilot community kitchens; School kitchens including solar cooker and thermos technology; Cultivation of legumes and mushrooms; Preservation of food with solar technology
2) Health
3) Water
4) Garden Culture; Ecological Agriculture, Rural Development
5) Energy
6) Construction
7) Transport
8) Financing
9) ARTIS Expert System
10) Education, Job Creation

Challenges of OSAT

Create millions of jobs for gardening, water technology, reforestation, household energy etc.

Note: 500 million cooking systems, with an effective power of 1.5 kW each, have an installed power of 750 GW, i.e. the installed power of 750 nuclear power stations.

How can obstacles to the spread of AT be overcome?

Do not spread "poor-people-technology“

Do not stick to primitive manufacturing processes and materials

Minor criteria of the Appropriate Technology (AT) should not become crucial barriers (e.g. not only allow local material ...)

Provide funding sources

Provide institutional support (e.g. ARTIS) including the educational system

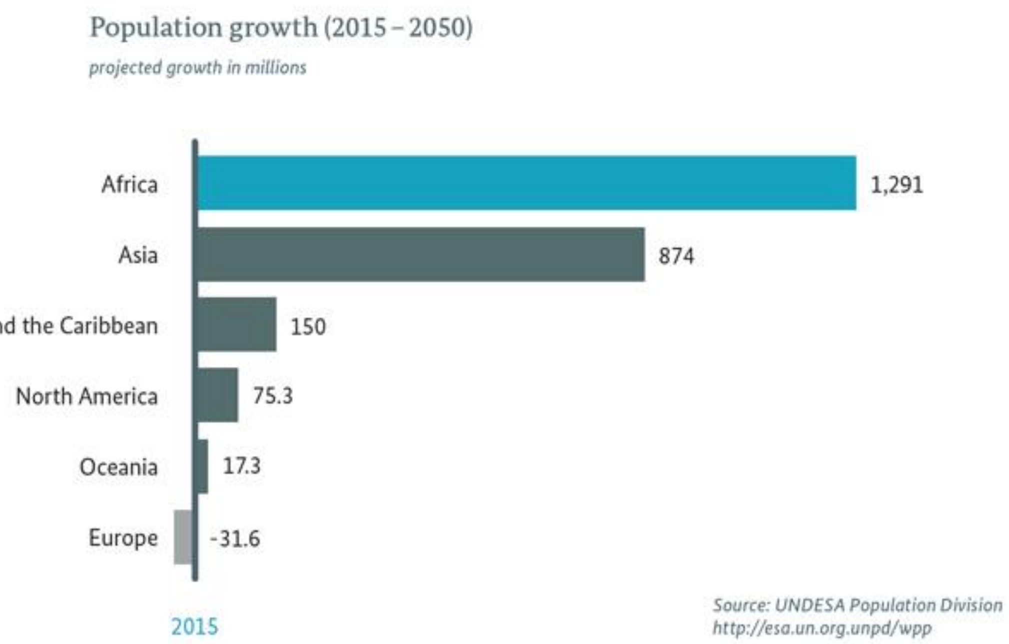
Apply opportunities of television, not just the Internet.

A Marshall Plan with Africa

Chapter 1.3 The continent of opportunity

Source:
https://www.bmz.de/en/what_we_do/countries_regions/marshall_plan_with_africa/index.html

„The most important question that must be answered by a Marshall Plan is: How can 20 million new jobs be created that give young people prospects for their future without destroying the environment?”



Dr.-Ing. Dieter Seifert wrote on 01-02-2017:
A contribution to answering this "most important question that must be answered by a Marshall Plan” can be found in the documentation "Proposals for OSAT and ARTIS" on the Internet, which proposes innovative institutions committed to the common good (African Research and Technology Institutes for Sustainability - ARTIS), engaged for development and dissemination of Open Source Appropriate Technologies (OSAT) in Africa, for opportunities which are in harmony with Africa's resources, which create millions of pleasant jobs, promote self-initiatives and living in dignity, and avoiding the imitation of fatal developments.

Conclusions

There are enomous opportunities from OSAT for sustainable life on our planet, for creation of perspectives, for the avoidance of damages and prevention of conflicts.

Worldwide spread of Garden Culture is fundamental, which deploys the enormous potentials of human ressources, land, biodeversity, solar energy ...

We can build on the worldwide open source knowledge and preparatory work of NGOs, but a new dimension of cooperation is necessary to escape from poverty trap.

Thank you

Garden culture
is fundamental
for the
future of
mankind

Worldwide
any
household
interested
should have
a garden.

Notes to a pilot project for an African Research and Technology Institute for Sustainability (ARTIS) (1/2)

please see also:
http://solarcooking.wikia.com/wiki/File:Traditional_Charcoal_in_Africa_and_need_of_African_Institutes_ARTIS.pdf

This proposal regards the foundation of a pilot ARTIS-Institute at a university for innovative Open Source Appropriate Technology (OSAT). Examples are given for pilot programs for research, development, testing, evaluation, teaching, dissemination and job creation.

A) Tasks (1 … 10)

The tasks arise from a fundamental question: How to create positive perspectives and satisfactory living conditions for everyone in Africa?

1) Nutrition
Intensive garden culture; Preparation of food without stress and strain (without breathing of polluted air, costs and deforestation);
Pilot community kitchen; School kitchen including solar cookers and cooking with retained heat;
Preserving food with solar technology; Solar dryers; Growing of pulses/legumes, mushrooms etc. ; see 4);

2) Health
Medical station; Family planning; Disease prevention; Sanitary facilities; Adaption to Climate Change;

3) Water
Avoiding water contamination; Water filtering and sterilization; Water retention technologies; Embanking; Drip irrigation;
Seawater desalination; Wastewater treatment; Adaption to Climate Change;

4) Horticulture; Ecological agriculture; Carbon storage through biochar; Village development
Teaching gardening; Botanical gardens with cultivation of adapted plants; Carbon storage in the soil combined with improvement of soil fertility by biochar, produced from appropriate waste biomass; Energy-plantations e.g. short rotation plantations (pigeon peas etc.); Adapted fruit tree cultivation; City gardens; Gardening for arid and semiarid regions (e.g. proposed by G. Kunkel) against desertification;
Waste prevention by recycling; Erosion protection; Afforestation; Village development; Adaption to Climate Change;

5) Power
Energy saving; Appropriate stoves; Biogas plants; Solar cookers; Integrated cooking with thermos technology;
PV lamps and PV chargers; Modern, sustainable charcoal production; Small wind turbines;
Use of solar energy and waste heat for desalination of water; Avoiding greenhouse gas emissions;

cont. next page

Notes to a pilot project for an African Research and Technology Institute for Sustainability (ARTIS) (2/2)

6) Construction
Passive domestic technology for hot climates; Solar air conditioning; Bottle houses (s. NGO LHL); Tin-can structures (s. Michael Hoenes);
Manufacture of stable bricks without firing (s. http://www.parqueciencias.com/parqueciencias/historico/otrasactividades/clausura-coloquio.html)

7) Transportation
Infrastructure; Transportation avoidance (Video conferences etc.); Cycling trails; Appropriate bicycles and trolleys;

8) Financing
Appropriate Sources; New programs , e.g.: http://www.bmz.de/de/laender_regionen/marshallplan_mit_afrika/

9) IT and Establishment of ARTIS EXPERT SYSTEM with availability on the Internet
Information; Communication; Statistics; Population development; Safety analysis (e.g., HAZOP); Environmental protection;
Adaption to climate change; Access and advancement of expert systems for sustainability with worldwide cooperation;

10) Educational programs; Job creation; Transformation to sustainable society
Vocational training; Programs according Practical Action (http://practicalaction.org/); “Future Workshops” (proposed by R. Jungk et al.);
Transition to sustainability (s. e.g. : www. wupperinst.org/ ; http://www.globalmarshallplan.org/); Pilot production with Open Source Appropriate Technologies to show how to create millions of beneficial jobs with low investment (according E.F. Schumacher’s advice);

B) Structure of the Institute

B1) Presidency and Management; Reporting; Quality assurance**;**
B2) Employees for each task: managers and assistants with offices and equipment;
B3) Training- and meeting-rooms;
B4) Laboratories;
B5) Workshops; Pilot production;
B6) Test grounds; plantations;
B7) IT system; Expert System
B8) Programs for job creation.

C) Phases of Institute development

C1) Feasibility study;
C2) Project pre-planning; Application for financing;
C3) Provision of financing;
C4) Project processing; Spreading of appropriate technology; Job creation;
C5) Further development of the institute; establishment of further branches.

Example of Open Source Appropriate Technology

Quelle: José Angel Garrido Vazquez, Madrid
Altiplano Bolivien, Projekt SOLIN

Phases of OSAT Innovations