

TOWARD A NEW SUSTAINABLE DEGROWTH: AN INTEGRATED EDUCATIONAL PROGRAMME FOR THE IMPROVEMENT OF TRADITIONAL EARTH CONSTRUCTION IN EMDIBIR-GURAGE-ETHIOPIA

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Do not ever change equates to improve, but we need to change to improve
Winston Churchill

1.The UNESCO. WHEAP Programme towards a new perspective of a sustainable degrowth

The World Heritage Programme on Earthen Architecture (WHEAP) is an UNESCO-WHC programme aiming to improve the state of conservation and management of earthen architecture sites worldwide. The programme basically seeks to identify best practices and supports examples for the development and dissemination of appropriate methods and techniques in conservation, management and capacity building in order to ameliorate know-how in the field. “Expected results include a better understanding of the problems facing earthen architecture, the development of policies favoring its conservation, the definition of practical guidelines and the organization of training and awareness activities, particularly in local communities through workshops, exhibitions, conferences and technical publications to raise the recognition of earthen architecture, as well as the creation of an active global network for the exchange of information and experience. Earthen architecture is the most original expression of the human ability to create an appropriate built environment with limited resources and the most sustainable and locally available material” **(1)**. For these reasons earthen architecture can be considered the most appropriate solution for the housing in a perspective of “prosperity without growth” **(2)**. Moreover earthen architecture includes a great variety of architectural urban and rural production, ranging from palaces to historic city centres, cultural landscapes, archaeological sites and vernacular shelters. The evidence of its cultural importance throughout the world has led to the consideration of the earthen architecture as a common heritage of humankind. In fact earth construction plays an important role in defining the identity of many local communities being an appropriate solution for the third millennium habitat in the degrowth perspective. There is in fact an increased interest for its ability to contribute to ecological and cultural assets. However, despite this interest the earthen architecture is increasingly threatened by natural and human impacts as global warming, floods, earthquakes, urbanization and disappearance of traditional building maintenance and conservation practices.

Considering that earth will probably remain also in the third millennium, one of the most important resources available to build low cost quality houses, it becomes urgent for the international community to focus on the safeguarding of the most outstanding earthen heritage around the world. At the same time it is also important to inform on the significant role of earth construction for social improvement as well as its great potential for contributing to poverty alleviation. In this perspective the World Heritage Committee approved, in 2007, the World Heritage 10 years WHEAP programme (2007-2017) with the main purpose to develop an integrated global approach to identify and formulate appropriate methods, techniques and policies of conservation and management for a sustainable development of earthen architectural heritage protected under the World Heritage Convention. This is to be achieved through development and dissemination of best practices of both conservation methods and techniques and technical adaptations using new available means, and through capacity building at State Party level. Implementation of these

activities should be supported by agencies specialised on earthen architecture and involve research projects, pilot activities in the field, publications on the results, awareness raising and promotional activities. The integrated educational programme for the improvement of traditional earth construction in Emdibir area in Ethiopia, described in this paper, is conceived in this operational perspective and delineate a new vision connecting prosperity, degrowth and bounded capabilities. The path of training is divided into two main areas: the study of vernacular architecture and local building cultures and the improvement of local building techniques using earth as basic material for the construction of new buildings respectful of local typological patterns but improved by protection from fires. This was indeed the original warrant that started the project.

2. Prosperity, degrowth and bounded capabilities

To be properly understood the degrowth perspective needs to be integrated in a new more developed vision of an appropriate approach to a future sustainable environment. "We are asked nothing less than to begin a journey of conversion and transformation of material and cultural foundations of the so-called "developed" societies. This path involves the re-signification of the very idea of welfare or well-living, the reconstruction on a basis of justice and interdependence of the "north-south" relationship and the redefinition of a pact of solidarity between generations. A change putting on our agenda topics and issues apparently very different - work, income, consumption, waste, energy, technology, mobility, education, citizenship - but actually inextricably linked. A project of degrowth exempt from all reductionism, economic ecological or political, can be proposed only through comparison and discussion that pay attention to connections, interactions, transversal linking, with a strong cross-disciplinary look capable of holding together natural and social sciences (3). It is in this vision that degrowth can include a new perspective of prosperity. "Capabilities for flourishing are a good starting point from which to define what it means to prosper. But this vision needs to be interpreted carefully not as a set of disembodied freedoms, but as a range of "bounded capabilities" to live well-within certain clearly defined limits"(4). These limits are established in relation to two critical factors being the first and most important, the finite nature of the ecological resources within which life on earth is possible. Earth construction, in this perspective, is an important operational tool that can contribute, to its characteristics, to improve the sustainability of the habitat of the third millennium. For this reason, the project presented here is in a perspective of overall sustainability since it tends to develop an appropriate approach based on resources available in the area and promote a deep research of the vernacular architecture, trying to understand the typological and technological characteristics as an opportunity able to introduce improvements to maintain the local cultural identity as well as the character of existing habitat and local building cultures.

3. The integrated educational programme for the improvement of traditional earth construction in Emdibir area Ethiopia:background

The project presented in this paper started in 2010 when, according to the basic aims of WHEAP Programme, in order to promote research projects and pilot activities in the field, awareness raising and promotional activities, the ONG, CeVI (Centre for International Volunteers) and Caritas Udine received a request of cooperation from the Emdibir Eparchy in order to solve a permanent emergency related to the fires affecting the vernacular settlements based on the typical *gojjo-bet* shelter (Gurage name of the vernacular grasshouse) of the area. The Friuli-Venezia Giulia Region has supported the project and funding of an intervention concerning the improvement of the vernacular earthen grasshouse housing in the Gurage region in order to innovate and enhance the traditional typology and building techniques, to avoid further damages due to the fires occurring both during the rain season as well as during the dry one. At the same time the to protect the existing landscape and the local population. University of Udine being a partner of WHEAP (World Heritage Earthen Architecture Programme) was requested to take part to the programme. Being the scientific counsellor of the Programme I was involved in order to provide a first monitoring mission and prepare an action plan.



1. Complete destruction of a vernacular Gurage *gojjo-bet*, after the fire affecting Dewa village in the Emdibir area

(photo copyright Mauro Bertagnin)

The basic idea of the proposed action plan was to start from the existing earthen grasshouse typology and from the local earth construction know-how in order to promote a new fireproof and improved earthen *gojjo-bet* shelter, enhancing also the existing hygienic indoor conditions.

In fact a progressive change of the Gurage landscape is today occurring with continuous evolution of shelters due to the fire threats and to the related spontaneous response to this problem that gives local population. This phenomenon occurs as a spontaneous response of the inhabitants of the region to avoid the fires of their homes. They progressively build their homes using new materials and construction techniques that, in their views, can solve the serious problem of fires. In this way the traditional *gojjo-bet*, with the classical pure form consisting of the superposition of a cone on a cylinder is progressively replaced by buildings with pitched roofs of rectangular shape with two pitches. In fact the traditional structure of the walls, made by sticking a dense network of eucalyptus poles in the ground and then plastering the inside with an earthen plaster, is maintained, but the shape of the circular layout of the dwelling is changed and becomes rectangular. To fireproofing the new house the walls are lined with local stone and the classic elegant wooden structure that supports the traditional thatched roof is replaced by a series of small wooden trusses that support the new corrugated iron pitched roof. According to this new building pattern the round shaped cylinder-conic landscape of the Gurage region with the dry grass roofs and natural colours is progressively changing into a parallelepipedal word with corrugated iron sheet shining roofs. This trend is affecting the global Gurage environment and create an evident transformation of landscape which can affect also the long term sustainable tourism appeal of the area.

Therefore the action plan conceived primarily aims to achieve a first step of awareness of the current ecological evolution of the environment. The basic idea is to promote an educational

stream based on the transfer to the young generations of the available skills and building know-how related to the vernacular earthen grasshouse construction and, at the same time, to provide a basic educational support for a better technical understanding of the importance of a contemporary improved earth construction as an appropriate solution for a third millennium sustainable local housing in the region.

Related carpenter and blacksmith skills will integrate the profile of the young students participating to earth construction, eco-design and sustainable educational stream promoted in the framework of the cooperation project. This educational approach will demonstrate that an innovative use of the earth technologies can produce new sustainable buildings, respectful of local building traditions and at the same time capable of avoiding fires thus preserving the landscape in a sustainable environment.

It is estimated in fact, at the beginning of the third millennium, that currently, on six continents, one half of the world's population, approximately three billion people, lives or works in earthen architectures being situated in ancient historical towns, contemporary business districts or in rural villages. Therefore promoting in the framework of the Emdibir-Selem Bet Pilot Project the continuity and the improvement of the earth construction tradition, in a peculiar context like the Gurage region, can contribute to create a new positive trend both in terms of degrowth and in terms of sustainable development. In fact one of the basic aims of the Pilot Project is to promote a new awareness of the importance of the world earthen architecture and going beyond the basic misconceptions associated with earth construction such as that earth is a weak material, suitable only for housing in poor rural areas, like Gurage area, while in reality some of the oldest existing buildings are made using earth techniques and an increasing amount of contemporary architectures in western industrialized countries are built with earth as basic material. Moreover the Pilot Project try to demonstrate that earth is also the most intrinsic ecological material, locally available, being the structures made of it totally recyclable and that the utilization of earth, as building material, also requires little embodied energy with excellent thermal mass properties (5). The thermal mass properties of the earthen architecture can also help to maintain, according to the seasons, comfortable indoor temperatures without using any mechanical heating or cooling systems. This factor is particularly considered especially in climatic realities such as the Ethiopian plateau, which is characterized by a long hot dry season.

The most important expected result of the earth construction educational stream, promoted in the framework of the Emdibir-Selem Bet Pilot Project is also to create a first step of awareness of the importance of the conservation of the earthen architectural heritage in the region and aims also to provide practical and technical skills related to the conservation and improvement of existing vernacular earthen shelters and to promote a new perspective of sustainability for the third millennium habitat in Gurage region.

4)Research on vernacular earthen architecture, achievements of the related educational programme and new experimental improved buildings

To undertake an effective action in terms of the solution of the basic problem which is to make fireproof the broad vernacular architectural heritage of the Gurage region has been carried out a deep research on typology and technology of the traditional earthen vernacular dwellings.

The research on Gurage vernacular earthen architecture has focused on local building technologies and on the traditional architectural types as well as on the nomenclature of the various building details in order to foster a better understanding of the features and intrinsic qualities of the vernacular Gurage architecture.

A detailed study of the reasons for the outbreak of fires, during the dry as well as the rain season, have also helped to identify the useful correctives to prevent the further spread of the fires, limiting damages and in some cases even death of the inhabitants.



2. Vernacular Gurage *gojjo-bet* (photo copyright Mauro Bertagnin)

Such corrections are expressed in the design and construction of three new experimental buildings one of which to be built during next step of the training and the other two already completed in the design and implementation, which will serve as building tests. The construction of the experimental buildings could also help to test the results of long-term improvements introduced, in order to solve the problems of fires and also provide a comprehensive training to young students on earthen architecture both in theoretical and practical terms. The proposed training program is in fact structured in a dual path helping the students to experience the practice of earth construction directly on the field after an intensive theoretical course. The practical stream is made through the project and the related construction of three experimental buildings that will a help to provide a comprehensive training to young people on the earthen architecture. The theory and practice are balanced in a joint relationship. The intensive courses are concentrated in two weeks and the theory, after a series of introductory lectures on the history, evolution and modernity of earthen architecture, is focusing on the importance of conservation of World Heritage Earthen Architecture, and it is also closely related to the practice that will be experienced later on site by the students (for example, earthen plasters, adobe production etc.)

5) Learning from vernacular: the *gojjo-bet* replica

To better understand the sophisticated techniques of construction, the sustainable use of local materials and the refined technological solutions that characterize the vernacular architecture of the Gurage and also promote the transfer of traditional knowledge related to the vernacular construction was designed and built a first building consisting of the experimental 1:5 scale replica of the traditional Gurage *gojjo-bet*. A local craftsman, experienced in vernacular construction

techniques was invited to lead the construction yard. He was able to involve the students, participating in the workshop, at all stages of the traditional construction, teaching them all phases of vernacular yard and the appropriate choice and use of local materials. The experimental yard started in fact from the proper choice of local materials such as the false banana leaves to create appropriate strings to bind the different parts of the wooden structures.



3. Students, during the workshop, with the help of a skilled Gurage craftsman reconstruct a 1:5 gojjo-bet. The experience helps them to rediscover the vernacular construction knowledge.
(photo copyright Mauro Bertagnin)

He also taught how to choose the dry grass for the cover layer of the thatched roof, the appropriate eucalyptus and bamboo woods for the walls and the roof structure and where to find the earth for plasters. All these materials have been used in the later stages of the construction of the wooden circular walls, plastered with earth and of the conical refined wooden structure under the thatched roof in dry grass. In such a way the students involved in the yard, have had the opportunity to absorb, directly from the vernacular knowledge on traditional construction, transmitted by the artisan, the lesson of the history, also through the reproduction, in real terms, of each step of the vernacular yard. Moreover the teachings of a skilled local craftsman has allowed young Ethiopian students also to understand the importance of transmitting the details of the vernacular architecture in all their aspects and all the cultural values embedded in the traditional construction yard.

6) Improving the vernacular

A second building designed and built as pilot prototype, in the framework of the Pilot Project, is a traditional *gojjo-bet*, recently built according to the vernacular patterns which was improved with simple measures in terms of protection against fire through practical exercises during the first workshop which was attended by students.

This recent vernacular architecture is already built and implemented adopting all the fireproof measures designed and tested during the first workshop and will be soon available to the function of accommodate the tourists for which it was designed and built. This building will be used in fact as accommodation for tourists who wish to practice sustainable tourism, experiencing the traditional way of living in an authentic Gurage house.



4. Extension, during the workshop, of earthen plasters to the outer surface of the traditional circular wall made sticking in the ground poles of eucalyptus wood.
(photo copyright Mauro Bertagnin)

The improvement works have focused on a simple set of operations able to reduce, if not even eliminate, the possibility of fire and fire attacks in various parts of the traditional *gojjo-bet*. A first intervention concerned the extension of the earthen plasters also to the outer surface of the traditional circular wall made sticking in the ground poles of eucalyptus wood subsequently connected by a horizontal bandage, made using the same poles of eucalyptus halved and folded creating a sort of wooden dram-wall. Such operation of external plastering has tended to prevent the attack on the outer surface of the wall of the fire that encountering a protective earthen layer can not propagate along the outer wall surface. Besides the study of various recipes of earthen plaster, students have also learned, during the construction yard, various techniques for the application of the appropriate earthen plasters. A second operation, since many fires are generated from the inside, during the cooking phase of the food, involved the preparation of a clay based liquid mixture sprayed along the entire inner surface of the large conical roof of *gojjo-bet* in order to limit or prevent the spread of fire from the inside. A third intervention involved the excavation, along the base of the wall of the building, of a circular channel, collecting rainwaters flowing from the roof in two tanks dug near the building, that will constitute a reserve of water available in case of fire emergency during the dry season.

A third intervention involved the removal of the metallic can which is usually used to protect the top

of the central wooden pillar which supports the entire roof structure of the building and its replacement with a vessel earthenware. This intervention was necessary to prevent the attack of lightning. As additional measures of protection against fires was intended to create an external unit built in local stone containing a fireplace, a toilet and a small stable housing the animals during the night in order to improve the hygienic conditions of the dwelling. A further typological improvement introduced is realized by the creation of a small external unit, with the same features of the *gojjo-bet* adjacent to the vernacular improved *gojjo-bet*, containing a fireplace, a stable and a small toilet- shower unit. All these improvements seek to prevent or limit the outbreak of fire and at the same time to avoid indoor air pollution and improve the hygienic conditions, using the water stored during the rainy season for sanitary purpose.

7) Innovation preserving the vernacular values

The basic goal of a third building experience, included in the Emdibir-Selem Bet Pilot Project, can help to solve an important question such as how to counter the current trend of transformation occurring in the Gurage region while maintaining the vernacular shelter shape and the typology, but also by adopting new building systems that can avoid the fires and at the same time maintaining the existing landscape balance.

As stressed before, a progressive change of the Gurage landscape is occurring with a continuous evolution of shelters due to the fire threats.



5. New rectangular typology with corrugated iron sheet roof, creating an evident transformation of the Emdibir and Gurage landscape
(photo copyright Mauro Bertagnin)

Progressively the vernacular round shaped cylinder-conic typology, with dry grass roof is changing into a rectangular typology with corrugated iron sheet roof, creating an evident transformation of

the landscape which can affect the long term sustainable tourism appeal of the area. In order to reduce the impact of this trend in the Emdibir area and generally in the Gurage region an architectural and technological research is currently underway in order to try to limit the impact of this phenomenon. While we cannot prevent the local population to find self-help workable solutions of the problem of the fires is important to display clever technological and typological options to respond to the needs of the population in order to solve the fires threats.

A prototype of a new shelter based on the continuation of the typical vernacular housing pattern of circular plan and conical roof able to ensure the safety against fires is being completed a design research on a new house prototype.



6. A prototype of a new shelter based on the continuation of the typical vernacular Gurage housing patterns

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The new house prototype is based on the creation of an adobe spinneret to be used for the construction of the walls to ensure the safety against fire by replacing the current structure made of wooden poles of eucalyptus. After an appropriate training a targeted production of adobe has already been initiated during the last workshop and the adobes produced, will be used in the yard of the construction of new fireproof house prototype. The experimental new building, respecting the vernacular typological patterns, will also include different technological options for a fireproof conical shaped new roofs such as the use of modified corrugated iron sheet panels, locally available, or a fireproof treatment with a clay mixture.

8) From awareness to a new sustainable environment: shelter, food and health

The structure of the Emdibir-Selem Bet pilot project it is completed by a number of other initiatives which serve to promote the vision of what I have called “sustainable degrowth” **(6)** that characterizes the project as a whole.

The integrated Emdibir-Selem Bet Pilot Project is conceived, in fact, in a holistic and integrated manner, in order to face the various problems and needs of the local population having clear that every issue, such as housing, for instance, should be linked to other needs of the population and the environment. Starting from the classical triad of basic needs such as shelter, food and health the project has tried to evaluate the existing resources and find an integration between the various levels.

With regard to the theme of the shelter a suitable communication strategy has been set up in order to help the young students as well as the local population to understand how complex and articulated environmental and ecological issues are underlying the problems of the present situation. Moreover, an attempt to identify all the areas of overlap and the moments of possible integration between the various problems that accompany each choice of a material or construction technology and the impact they have on the environment but also the ecological opportunities they present.

For example, we tried to concentrate all the available straw of barley, wheat and *tef*, the most widely produced local grain in the pilot project area and to enhance the product using a manual machine to produce straw bales in order to help the storage, protection and subsequent use for the production of adobe or earthen plasters.

Being the straw is produced only during the harvest of cereal without proper compaction and subsequent storage in bales it is generally wasted, and still is not available under certain quantities at the site or when necessary. Moreover the availability of straw bales produced in modular manner also allows to formulate appropriate recipes with certain quantity of product to be mixed to obtain adobe and earthen plasters mixtures of verifiable quality. Also with regard to "shelter" stream a first step of an appropriate communication strategy was the design of an photographic exhibition on the quality of the earthen architectural heritage in the Gurage region and potential innovations in the earth construction. The permanent exhibition, hosted in the Vocational School, is still in completion. A special section was devoted to the problem of fires and landscape transformation due to changes in form and structure of the vernacular architecture due to the fires emergency.

Regarding the "food" stream was launched at the gardens of the guest house Selem Bet and of St. Antony Vocational School, an ambitious project of organic agricultural production which aims to revive in the Gurage Experiences similar to those in Benin and then developed in other African countries to refer to the Songhai project (7).

The idea is to promote at the guest house the possibility of eating organic vegetables produced locally, in such a way promoting also sustainability in the field of responsible tourism. The guest house Selem Bet welcomes in fact basically only guests and tourists interested in sustainable tourism and wanting to make their holiday also spending little time to learn something on the ongoing cooperation projects some of them are also underway in healthcare field.

Regarding the "health" stream, in addition to the establishment, at the Selem Beth guest house of a point of reference for particular health emergencies, a project of improvement of sanitary conditions in the new housing is under design. In this way the Emdibir-Selem Bet Pilot Project, will help create a new environment for the future. Improve the hygienic conditions of the existing traditional housing, try to limit and mitigate the impact of fires on houses, new typological models and to propose new residential vernacular building respectful traditions but attentive to the needs of populations.

The "improvement of the tradition in a sustainable degrowth perspective" could be the slogan that accompanies such an experience that has attracted the interest of the local administrators also important international bodies like UNESCO and FAO. This experience is in fact the result of a particular vision attempting to combine the needs of a sustainable development based on the optimization of existing resources locally available, on organic food production, on energy saving and on training as a vital resource for a qualitative based degrowth in the third millennium.

NOTES

1) See <http://www.unesco.org/new/en/whc/activities/> "The World Heritage Programme on Earthen Architecture (WHEAP)". From the beginning (2007) the author is the Scientific Counsellor of the WHEAP Programme.

2) Jackson Tim (2009), *Prosperity Without Growth. Economics for a Finite Planet*, Earthscan Publisher, London-Washington DC.

3) cfr. "The Great Transition: Degrowth as a Passage of Civilization" 3th International Conference on Degrowth For Ecological Sustainability and Social Equity, Venice (Italy), 19th-23rd September 2012, Preparatory Document of the Conferente

4) Jackson Tim (2009), *Prosperity Without Growth. Economics for a Finite Planet*, Earthscan Publisher, London-Washington DC., p.4.

5) Important academic researches have studied in the past, the mass effect demonstrating the good thermal capacity of earthen construction and energy savings related to the natural cooling during the hot season and the reduction of heating costs during the cold season. As an example see: Steven Goodhew, Richard Griffith, *Sustainable earth walls to meet the building regulations*, Plymouth PL4 8AA, UK School of Architecture and Design, University of Plymouth, Hoe Centre, Nott Street, Plymouth PL1 2AR, Devon, UK, *Energy and Buildings* 37 (2005) 451–459, Elsevier.com.

6) Mauro Bertagnin, *Building with Earth: Towards a Sustainable Degrowth*, WAVE 2012, IUAV, Venice, Bertagnin Workshop Paper, n.2, July 2012.

7) The *Emdibir-Selem Bet Pilot Project* aims to inspire to the operating philosophy of the project Songhai. The Songhai Centre promoted since 2008 by the United Nations as a Centre of Excellence for Africa is a Centre of Excellence for Agricultural Entrepreneurship projects of ECOWAS. Named after a prestigious West African empire founded between the XIVth and the XVIth century, Songhai is a non governmental organisation established in 1985 by Africans and a group of African friends. The idea to establish this NGO originates from the miserable situation of Africa in terms of development with problems like rural exodus, food insufficiency, brain drain, environmental degradation, non valorisation of the opportunity for economic growth and subsistence agriculture. As an example of the ongoing Songhai projects See on: Economic development, current events, travel, sustainable living, and fatherhood, all from an agrarian perspective. *Agrarian Ideas for a Developing World*. and At the Songhai Centre, Cotonou, Benin – February 18, 2011 – A Most Auspicious Day.