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Participatory action research as a tool in solving desert vernacular architecture problems in the Western Desert of Egypt

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Abstract
Vernacular architecture is suffering all over the world and Egypt is one of the countries where the desert vernacular is facing a great risk of disappearance. The aim of the research is to introduce a methodological approach applying participatory action research (PAR) as a tool to help save the future of the currently deteriorating desert vernacular architecture. The aim was to help prevent further loss of desert vernacular architecture knowledge and to encourage vernacular know-how in becoming a living part of future building practices. To benefit from local know-how, a desert vernacular model house was constructed using PAR methods that engaged the local community throughout the design and building phases. The model house was constructed based on an understanding of desert vernacular architecture as well as of the urban fabric and building technology. The town of Balat in the Western Desert of Egypt was chosen as a location for this research work application. As this is an international problem the research developed several techniques within PAR, applied in a flexible way, giving the opportunity for further application in similar vernacular settlements suffering from similar problems.

Keywords
Balat, community participation, desert vernacular model, participatory action research

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Introduction

Desert vernacular settlements in the Western Desert of Egypt are facing dramatic problems. Inhabitants in desert vernacular dwellings, for example, are leaving their houses to deteriorate and moving away from their old towns and villages. Others demolish their vernacular dwellings and replace them with houses made from industrialized building material. The authors of *Vernacular mud brick architecture in the Dakhleh Oasis* stated that in many places in Western Desert oases this form of architecture is slowly being superseded by more recent building techniques using reinforced concrete and concrete blocks (Schijns, Kaper, & Kila, 2003), a process that likely leads to a catastrophic transformation of desert vernacular architecture heritage in Egypt. We will not only lose such tangible heritage but the intangible part of it as well because even the building know-how regarding traditional vernacular desert settlements, some of which date back to the 12th century, is unfortunately not well documented.

The aim of this project was to provide a tool to help to save the future of the currently deteriorating desert vernacular architecture and its significant values. To fulfil this goal, a participatory action research (PAR) model was developed to assist desert local inhabitants and researchers in Balat town in Dakhla Oasis in tackling vernacular problems through collaborative process. The model developed is intended as a support for keeping the essence of sustainable aspects of desert vernacular building knowledge, while incorporating residents' desires for modern amenities and reducing housing maintenance.

The real outcome of this experiment is to show that through participation and local community involvement the vernacular method of building through trial and error can be adapted to address current community habitation needs. In vernacular, one can try various approaches without penalty since unsatisfactory outcomes can easily be corrected. The findings from this research can give guidance and solutions to politicians and policy-makers who are struggling to find effective alternatives for desert communities' housing problems.

This research problem is one of common kind, not only in many rapidly developing regions but worldwide in remaining vernacular settlements. The research process was designed for flexibility and easy modification for further relevant or similar applications.

Balat town as site

The small town of Balat (25° 34′ N, 29° 16′ E), built at the eastern entrance of the Dakhla Oasis, is situated at the junction of two old caravan routes in the Western Egyptian desert (Bard & Shubert, 1999) (Figure 1). The Dakhla Oasis is one of the five principal oases located in the Western Desert of Egypt (Siwa, Baharia, Farafra, Dakhla and Kharga). It is located approximately 800 km southeast of Cairo. Several studies have discovered that the Dakhla Oasis has been inhabited since prehistoric times. Like the other oases in the Western Desert, Dakhla covers an

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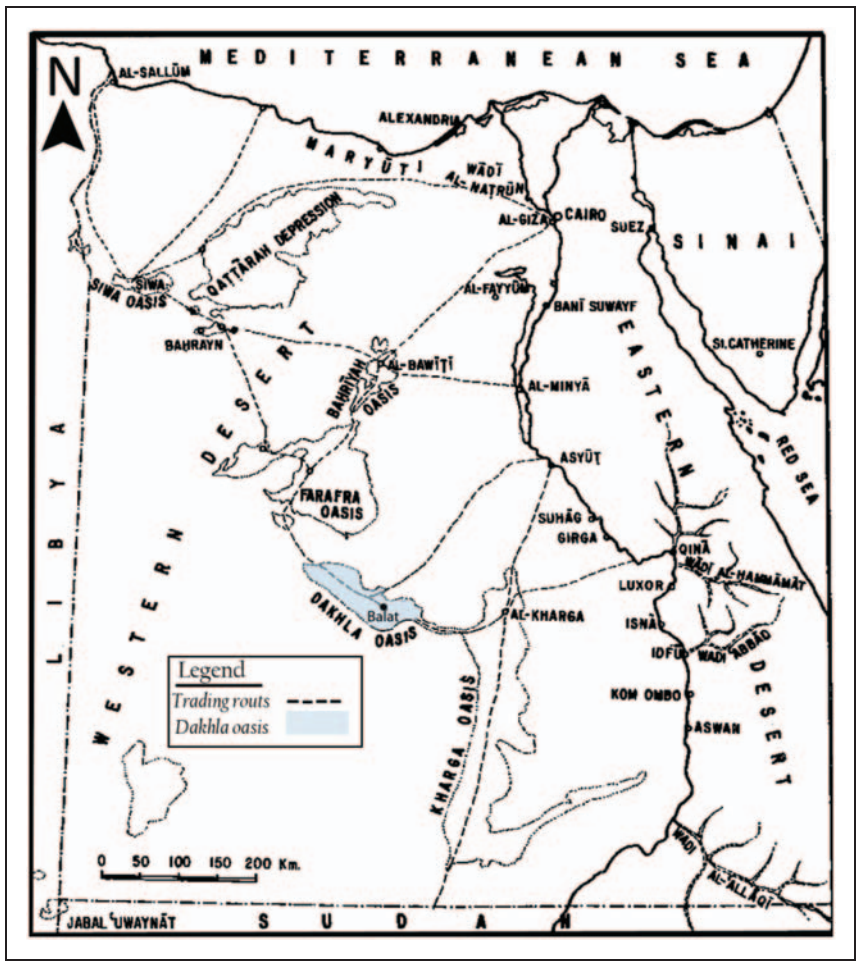

Figure 1. Edited map of Egypt, showing the location Balat in Dakhla Oasis in the Western Desert. Main map source: Ahmed (1973).

area of about 3000 km^2 and there are about 30,000 acres of agricultural land. Many of its 70,000 inhabitants are farmers growing rice and peanuts together with mulberry trees, date palms, figs and citrus fruits in gardens.

Balat is 22 kilometres from Mut, the capital city of the Dakhla Oasis, and around 800 kilometres from Cairo, the capital of Egypt. Balat was a major old kingdom in the oases (Pantalacci, 1998) and was considered the chief town and headquarters for the governor of the oases in Egypt at the end of the Old Empire (2350–2150 BC) (Gunn, 1925; Krieger, 1976). According to the Central Agency for Public Mobilization and Statistics in Egypt, Balat's population was about 5100 in 1996 and about 6500 in 2006, including both the old town core and its periphery.

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Based on my estimation in 2008, only 30 extended families are still living inside the old town core. The rest moved to live on the outskirts of the town in new houses. An environmental assessment done in 2007 for secondary cities by Egypt's Infrastructure Improvements Project projected a growth of 10,000 by 2030.[1] According to the 1996 census, 37 percent of the population is illiterate, 17 percent is literate, and the remaining 46 percent are in schools. Thirty-four percent of the populations are farmers, 18 percent are teachers, 13 percent are in commerce and 35 percent are employed in administrative governmental work.

The choice of Balat for a case study of desert vernacular architecture in the Western Desert of Egypt was mainly based on the strength of observations during the preliminary site investigation and the locals' willingness to support the research idea, which thus increases the possibility of project success. During my four years working with Balat locals, I came to understand that Balat is a place that, in addition to farming, has harbored many traditional crafts for hundreds of years, including traditions of carpentry, blacksmithing, oil pressing, mud plastering, mud casting and pottery making. Inhabitants who lived harsh and ascetic lives were working and continue to work and build within ancient traditions that personified discipline, persistence and insistence on perfection. I learned a great deal from Balat inhabitants during my work. I baked, cooked, plastered, cast mud brick and shared with them many social activities as well.

Balat was also chosen for its historical, architectural and topographical significance. This study thus follows the admonition of Yin (2009), Stake (1995) and Feagin, Orum, and Sjoberg (1991) to select a case study location so as to maximize what can be learned in the period of time available for the study. In this regard, there are several factors that made Balat the suitable choice over other possible desert settlements.

1. Balat still maintains its cultural and historical identity, with its concomitant architectural features and details.
2. Field observations revealed that 60 percent of the town is still in a physically stable condition, and that the degree of demolition is minimal compared to villages and towns in other desert oases.
3. Site investigation showed that the town is still inhabited, and a lifestyle typical for farming, baking, practising rituals, socializing, grinding wheat and oil pressing still exists, compared to other towns that are totally deserted.
4. There are no signs of vandalism and no replacement of traditional architecture by new concrete houses within the old town. People are keeping their traditional dwellings and some inhabitants are still maintaining their old dwellings, even if they have left them to live in new concrete ones outside the old town.
5. Balat was declared a protected site by the Egyptian Supreme Council of Antiquities in 2006. This protected the town from violent acts or demolitions and provided for control of any change in its character.
6. My personal interest in Balat[2] is also influenced by its distinctive artistic appearance, aesthetic, architectural qualities and urban typology. I see it as a rescue case.

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Cultural and social characteristics in Balat

In Balat, vernacular architecture is a record of the lifestyle of the past when inhabitants were trying to find a sustainable way of life, just as they are trying to now. The vernacular in Balat exhibits the potential of the local community to organize spaces, evolve a strong architectural base and enrich their lives through their own local culture.

Many traditions, including building customs, were not recorded and are instead handed down from one generation to another by word of mouth. Local community traditions in Balat are a mix of all behaviours and attitudes that manifest themselves in every single aspect of daily life. During the documentation of cultural and building traditions, I was often told by the inhabitants during interviews that when a family decides to construct a new house, they call their neighbours and relatives to help. They share together all the building process, starting with the casting of mud brick and ending with the preparation of the acacia wood logs for roofing. If the house owner does not have a farm of his own from which to get the wood, he can ask a neighbour or a relative to get him the beams needed for construction. In return he offers another crop or he is offered the wood as a gift.

One of the most significant cultural phenomena in Balat is that buildings were not isolated, a characteristic that distinguishes them from the single-purpose units that we can see nowadays in the newly constructed buildings on the periphery of the old town. In addition, vernacular houses used local materials, and did not import materials from elsewhere as is done in the modern buildings. Most houses were considered centres for producing the materials needed by the local community in Balat. The whole Balat community was often self-sufficient, producing among themselves all the basic necessities of daily life.

Locals in Balat who moved out of the old town to live in the modern concrete houses are losing parts of their cultural and traditional identity (Figure 2). The regional values are now starting to be mixed with various perceptions of modernity, which pose a risk to the original desert vernacular values. Desert vernacular in Balat sets an example of harmony not only between dwellings and dwellers but also between the built milieu and the natural environment, a harmony which is often ignored in their newly built modern houses (Figure 3). In addition, advanced technical facilities in the new concrete houses have formed a new cultural barrier. It prevents people from returning to their traditional houses. From interviews with locals who are living now in concrete houses in Balat, it became clear that in their opinion going back to live in mud brick houses without modern facilities represents returning to old-fashioned housing and living forms that they no longer feel are acceptable.

The younger generation in Balat are afraid they will be looked down upon if they live in mud brick houses. Although youth still value and respect their ancestors' dwellings, they cannot see mud brick houses the way they are now as a solution for their future housing. The young are seeking a more ambitious way of living and they feel that, to cope with new living demands, they need

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Figure 2. The new concrete urban pattern surrounding the periphery of Balat.

Figure 3. The human scale and smooth curves that are a main feature of earth buildings in Balat.

modern housing that provides more facilities such as those they found in big cities.

The outcome from the interviews shows that locals in Balat leave their houses because they suffer from many common problems in their vernacular dwellers, including:

1. They need electricity for electrical appliances such as computers and refrigerators.
2. They need a good water supply, drainage systems and natural gas for their cooking and baking stoves.

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3. They need to avoid structural cracks and to exert less physical effort in regular home maintenance.
4. They need safer houses in case of rain and earthquakes.
5. They want to get rid of insects such as white ants or termites that case structural cracks.
6. They need larger spaces inside their houses, which traditional structures cannot always offer.
7. They need to make use of the land value and build more than two or three storeys.
8. Finally, as locals see it, they need a shiny modern look for their houses and they want to use modern materials such as ceramic tiles and cladding to produce a look like that in cities.

An indicator from the questioners shows that 84 percent agreed that if the same facilities in concrete houses (water, drainage, gas, etc.) were available in the mud brick houses, they would move back.

Methodology

The enthusiasm to work on this project started in 2008 with a personal interest in vernacular architecture and a fascination with earthen construction. The decision to study desert vernacular architecture in the Western Desert of Egypt was based on my own and other scholars' belief that this strikingly vernacular heritage should be saved from the severe danger and acute risks it is now facing due to vandalism, demolition, rapid deterioration and neglect. As an architect it was always striking to learn how people designed and built vernacular settlements in the past without any technical education and how they produced spectacularly complex architectural forms. Moreover, their dwellings are still alive today and have managed to survive for centuries.

The research applied case study methodology divided into two phases, a descriptive explanatory phase followed by an exploratory phase. During the explanatory phase I conducted a questionnaire and interview survey with 60 Balat inhabitants. Interviews were used to gather information about Balat inhabitants' problems, behaviour, life habits and building know-how. Questionnaires, on the other hand, were mainly used to gather information about the opinions of Balat's inhabitants, their satisfaction with their current vernacular houses and their willingness to live in mud brick houses in the future. I started with conducting interviews first, in order to establish the criteria for the questionnaire sampling selection. Selection of respondents for both the questionnaires and interviews was based on stratified random sampling. The focus was on older men and women in the interview, while in the questionnaire, I tried to balance the selection of older inhabitants and youth (men and women) to provide a means to compare the answers of different age groups. The exploratory phase comprises participatory action research.

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Based on the outcome and analysis of both the historical data and the survey I conducted, a PAR methodology was applied to make it possible to deal with the complexity of the factors affecting the research problem and the architecture I studied in Balat. The participatory component applied the concept of community participation, which is broadly defined as a social process in which groups and individuals are assisted in order to help them communicate and decide about the future of a specific issue (Gramberger, 2001). Lawrence explained that many tools can be used to assist participants including conventional simulation methods and new information technologies that enhance communication (Lawrence, 2004).

PAR is a recognized form of experimental research that focuses on the direct practice of the researcher acting within a participatory community. Its goal is to improve an area of concern (Reason & Bradbury, 2001). It has been argued that PAR politicizes the research process as a base from which power relations are transformed and opens the research design process up to collaboration with community partners. This kind of collaboration might include data collection, analysis and planning (Mountez, Moore, & Brown, 2008, p. 221).

Stokols's study points to Kurt Lewin as one of the pioneer scientists practising action research through working with community participation. Lewin's concept of action research highlights the scientific and social value of research into community problem-solving strategies (Stokols, 2006). Applying Lewin's and Kolb's models in Balat case (Figure 4), the first step was to identify the problem together with locals. From my questionnaires and interviews with locals in Balat it appeared that they suffer from lack of facilities in their vernacular mud brick houses (as mentioned earlier), alongside safety issues due to deterioration of neighbouring deserted houses within the town.

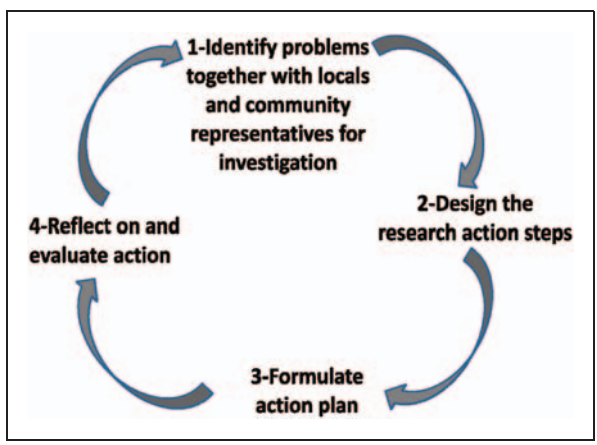

Figure 4. The participatory action research thinking model and formulation process derived from Lewin and Kolb experimental learning model (Kolb, 1984).

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This step is followed by the design of the practical action and implementation steps. First, I organized a local seminar with the help of the local municipality to share ideas and brainstorm about further steps (Figures 5 and 6). It was a good start that led to the third step which is formulation of the actual design and building phases of the house model. The fourth step was the locals' reflections through their contributions and the evaluation of the whole process at the end. The below sections will explain in detail the flow of PAR steps and phases.

Figure 5. Meeting the municipality of Balat personnel to arrange for the local seminar.

Figure 6. During the local seminar.

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My main role as a researcher in the PAR process was to initiate the participatory idea and to facilitate the creation of a mutually agreeable outcome, the model house, together with local Balat participants. The aim was also to help the locals maintain and continue the action research after the project's end, through the collaboration with the local NGO in Balat and the local municipality. Along the whole process I intentionally tried not to impose my ideas and give enough space to locals' participation as much as possible. To accomplish this, it was necessary to adopt many different roles at various stages of the process, including being:

- a catalyst, presenting the notion of thinking re-vernacular through the idea of building the desert vernacular model house;
- a planner for the local seminars and the design workshops;
- a facilitator during the building phase when decisions were taken among the local participants;
- an observer and documenter of the building process;
- a listener to the locals' discussions, demands and debates during the design and building phase;
- a synthesizer of the outcome of this PAR process.

Applying PAR brought together scientific research with the everyday experience of field practitioners, engineers, the local authorities, local investors, local NGOs and small local business owners, together with members of the local community in Balat.

Participation was used as a tool to create dialogue between the inhabitants and the policy institutions assembled in the representative employees of the local Balat municipality.[3] This dialogue was intended to enable all concerned to express ideas about their current needs, share in problem-solving as well as articulate their future aspirations.

The main concern was to empower local inhabitants. They were encouraged to contribute their ideas so that the method process could incorporate their specific cultural and traditional beliefs together with rituals; that is, the main concern of this phase was to include their sense of belonging to their community. During the entire participatory action phase, representatives of residents of Balat were involved in discussions with the following people: two civil engineers and one architect from among former Balat residents, a local contractor, two mason builders, three local carpenters, one local blacksmith, two local investors, five municipal employees, two local NGO members, one representative from the supreme council of antiquities, five small business owners and one university history professor. My role as a researcher and initiator of the idea was to co-ordinate such dialogue.

Carsjens argued that community participation, especially in design or planning projects, is necessary for obtaining appropriate solutions. She explained that the harmony between project outcome and users' requirements may avoid failure from non-asked performances or neglect of inhabitants' presence. She made a very

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important observation when she stated that planning for the people is obviously no longer acceptable, and planning with the people has proved to be too complex, so planning by the people has become the call of many conservation design and planning projects (Carsjens, 2009).

During the work applying PAR to the desert vernacular model house, an important aim was to avoid the 'hit and run' model that Stokols describes in his study *Toward a science of transdisciplinary action research*. This sort of model had led in many projects to frustration and annoyance among community members, as researchers gave advice about their problems and then left without showing practical solutions for how to solve them (Stokols, 2006). Sommer has pointed out that a researcher cannot tell people that they are mistaken and go away and expect them to change their actions or behaviours. He insisted on the necessity of working with communities to assist in the transformation process (Sommer, 1977).

Therefore I intended to be with Balat locals as an initiator for the idea and follow all the PAR planned phases till the evaluation of the project. Due to time constraints of PhD research it was not possible to wait for fund applications. The project is self-funded. The preliminary plans were to finish the whole house, but that was not possible with the available money. I had to make compromises and build only one room to test and apply the methodology. The completion of the project is now followed by the local NGO and the local municipality.

Local seminars and the wish lists

To initiate the PAR phase of this research, a meeting was organized with the municipal authority and the local NGO in Balat to plan for a local seminar. Approaching Balat inhabitants through trusted figures in the local community was the key to gain their trust and their willingness to co-operate. I discussed the alternative days with the municipality to decide a proper day that suited the majority of locals. That was an important means of increasing the chances for local participation. We agreed a Friday evening was the appropriate time for the locals as it is a weekend evening. The municipality chose a seminar hall well known by the locals and that could accommodate a large number of people (they used to attend health/farming awareness sessions there). The municipality was responsible for announcing this meeting and inviting all Balat dwellers.

I took the role of inviting local investors and small business owners together with the local NGO representatives, engineers, contractors and the craftsmen I met during my earlier site investigations and survey. Both genders were present, as well as people of different ages and professions. Families came together with their little children; for them it was a kind of an outing. The locals called this seminar a local conference and they were proud of being invited to a local conference organized especially for them. Forty-five persons attended the seminar in total.

A short introduction was given by the representative of the municipal authority about the purpose of this gathering; then the seminar started. I started with a brief introduction explaining the aim of the meeting and the final outcome we needed to

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reach from our discussion in the coming two hours. Visual aids[4] were used, direct tools easy for the majority of the locals to understand. The language was simple and the pace of talking was slow. Both pictures and videos were used as ways to attract audience attention and increase their involvement for as long as possible for the whole two-hour seminar.

The presentation was divided into four parts. First was a discussion of the current situation in the town as compared to other desert towns and villages in the Western Desert of Egypt. The second part was a slideshow showing mud brick houses in Europe and USA built in the 20th century. Third was a video showing an interview with social upper-class Egyptians living in mud brick houses in Cairo and Giza, the two biggest cites in Egypt. Fourth was a discussion on suggested solutions for current housing problems in Balat.

In general, these movies with interviews with other dwellers living in mud brick traditional houses in the capital city of Egypt were quite provocative and proved to be a very helpful catalyst in approaching the community. The Balat inhabitants listened very attentively to these people from the social upper-class of Egypt talking about the comfort of the indoor climate, health issues and cultural aspects. They showed people talking about how mud brick was a good solution for housing in the desert climate and better than concrete houses. Although the people in the films could have afforded to build with concrete, they choose to build with mud brick for the sake of better indoor climate. This idea helped in shifting Balat inhabitants' belief that mud brick houses are associated with poverty and low standard living conditions.

At the end of the local seminar, I suggested the idea of constructing a physical model house. Based on the discussion and questions raised. I assumed it would be a useful way to put the proposed solutions and adaptations for the vernacular houses into action and a trial model. It suits best the vernacular way of trial and error in building practice. When I raised the suggestion, the head of the municipality supported the idea as did Balat inhabitants' representatives. I came to understand at that point that the need for the involvement of locals was essential in the physical building steps, where it was necessary to benefit from their knowledge and building know-how.

The discussion was opened up after the presentation part and locals started to ask questions. The main concern raised was the economical issue of the built model idea. Some said, 'yes we are willing to try but we should know how much this model house will cost otherwise it doesn't worth trying if it is more expensive than the concrete houses we are currently building'. Also in Balat the children live close to their parents after marriage (the concept of nuclear extended family). They need to build for their children so for them the vertical extension is more profitable as they make use of the land value. I managed to show them instantly the Shibam city in Yemen. They were very surprised that it is possible to build with mud brick up to 14 meters high. They stressed again during the discussion the sanitary issue as mud brick is very fragile in front of water. However, the presentation covered part of the plumbing solution but they were still worried. A group of locals were not happy to

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build again by themselves. They said that it is a difficult process to cast mud brick nowadays. I discussed with them the idea of using hydraulic mud brick machines. I posed a question to the head of the municipality: 'Is it possible for the municipality to buy this machine and locals can use it based on reasonable fees?' The idea sounded appealing to him and he promised to check the possibilities.

A young man asked if it would be possible to build the house model on his land. He said, 'I will marry by the end of this year. I bought a small piece of land to build a new house using concrete. I am willing to build now with mud brick. Can we collaborate in that scene?' This idea didn't sound acceptable for the rest of the attendees. They wanted the model house to be a common property for all. They should have access to this house in the future if anyone wanted to see any construction detail afterwards. Also they wanted the house to be an experimental place, where they could try out other ideas or modifications.

Women were interested in the part of the presentation that explained the possibility of using bio-gas and solar water heating. They asked about details concerning maintenance and efficiency. One woman said, 'I heard that solar water heating is used in a nearby eco-lodge and they said it is very cheap.' The eco-lodge owner replied, 'Yes, I did that and you have to come and see how we use it. It is very efficient.'

One important point raised by one of the women was 'how to gain the know-how to build the bio-gas tanks. We need to use it now in our current houses.' I suggested a workshop be organized for them to learn how to construct such tanks. I posed the question to the head of the municipality and the NGO vice–president: 'Are you willing to help to organize such event?' Both liked the idea and we agreed that the municipality will invite two specialists from the capital city (Cairo) to come for four days and train 10 locals on bio-gas tanks with the help of the NGO.

Design with locals through modelling focus group workshop

During the seminar, I invited the locals to another workshop to design the desert vernacular model house (Figure 7). Seniors and youth were present in this workshop in addition to representatives from the local municipality and the local NGO, who also shared in this design process. Youth contributed by talking about their aspirations and future desires, seniors contributed with the local vernacular wisdom and experience, while the local authority and the local NGO represented the recognition of, and support for, the design and building process. Seventeen Balat locals in total participated in this design workshop.

During the design workshop, local inhabitants proposed several house design alternatives and all of the alternatives were discussed together (Figure 8). I asked them what can be a suitable design for a current traditional house configurations and facilities with modern living needs. Seniors talked about the necessity of house design to cope with the harsh desert climate, and youth talked about ceiling height,

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finishing materials and bigger spaces to accommodate electric appliances. Locals raised and discussed issues such as bathroom and kitchen utilities and the importance of proper drainage systems. They also asked questions concerning problems and technicalities such as water-proofing. I started to explain technical solutions and give advice for such problems. This work shop ended with one house design alternative that matched what the majority of the people needed. The aim was to create a flexible model design that could solve current problems in traditional mud brick houses and accommodate the modern living facilities that the young generation sought.

Figure 7. Design process with locals through modelling focus group workshop.

Figure 8. A sample for one of the alternative house designs drawn by locals on the ground.

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Pilot physical model house test

The last phase of the PAR was the implementation of the building phase in collaboration with local Balat inhabitants. A local carpenter and a local builder offered to participate and be paid for their efforts. Thirty-three persons from among Balat locals agreed to participate in the whole building process (31 men and two women) working for 20 days in shifts. They were paid for their effort for five working hours per day. I prepared the raw materials for building with the help of experienced locals.

The building phases started with choosing the site for construction. It was agreed in a meeting with the local municipality, NGO and community representatives from Balat that the northern edge of the old town was a proper location. The site selected was on the periphery of the old town and on the main road to the newly built concrete houses. The location also provided the chance for local inhabitants to pass by and follow the building phases on their daily journeys to and from their farmlands. One hundred square meters were donated by the local NGO for the model and the local municipality facilitated building permits and thereafter followed the work flow and progress every other day.

The desert vernacular model house was not based on just creating and supporting a process that produces dwellings resembling traditional houses. The concept is deeper. The model house was seen as a means of incorporating inherited intangible values in ways that respond to contemporary needs (Figure 9). The aim was thus to build on the traces of the old vernacular tradition and map them onto the future. Hinds argued in his research around this point that the approach to the past only becomes creative when the architect is able to go into its inner meaning and content. He added that it can be dangerous when the vernacular is reduced to merely resembling past architecture and just focusing on form (Hinds, 1965).

Figure 9. Discussions leading to suggestions for changing the rooms' orientation on site.

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Figure 10. Applying the mud brick and the mortar layers.

Figure 11. The built room of the neo-desert vernacular model house during different work phases.

The implementation of the desert vernacular model passed through 10 phases. During planning and construction, all 10 phases of application of the model were completed. The project thus allowed the locals to share their experience of using the vernacular building tradition while making adaptations to solve current problems. The process also allows the young both to participate in and to see the traditional vernacular techniques. It provided a chance to show what the seniors could give

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from the past and what the youth could create for the future. It was also a chance to revitalize the concept of co-operation among family members and neighbours. For example, the group that participated in the wall construction phase were from the same family and they asked their neighbours and close friends to come and participate.

Only one room of the full house was finished. What was more important to complete were the construction phases. Completing all steps allowed testing the application of this participation model idea. This helped in verifying the applicability of the concept and in applying participatory action research. The house was not meant to be a prototype or blueprint to be replicated. It was a trial to gain insights into specific ways to revitalize the desert vernacular building know-how concepts and to help make them sustainable and adaptive to current and future needs. The implementation of desert vernacular model house was meant to be a catalyst for a way of building that the inhabitants could continue in solving their current problems themselves in future applications (Figures 10 and 11).

The evaluation of the model house idea

In this building experience, local inhabitants had the feeling that they were sharing in the building process. They were involved in all building steps and they felt that their experience and tacit knowledge was valuable. They addressed their current problems using traditional housing techniques. Discussions about technical solutions were many and advice was shared when needed.

Fifteen inhabitants (11 males and four females aged 19 to 55) were interviewed after the building phases were completed. They were asked about their impressions, likes and dislikes. Eight of the participants were living at the time in concrete houses and seven were still living in the old town. Ten of them had participated in the building process and the other five had only followed the work process.

The interviews show willingness from locals to continue using the old techniques if they provide ways to solve their problems. One of the senior interviewees said: 'I liked having the positive aspects of concrete houses in a mud brick one.' It was hard for some of them to decide because the partially completed model house did not show the whole image of a house built with traditional techniques that at the same time had all the facilities they needed. One of the interviewees said: 'I am not sure yet that I will build with mud brick; I found it interesting and easy to build. I need to see the rest of the house to decide.' However, the interview responses indicate that the idea of the project should be continued, that there is in fact a possibility of acceptance by the locals and that there is hope of saving the desert vernacular in a sustainable development cycle.

Conclusion

This article discussed the application case study methodology in applying participatory action research approach in desert vernacular architecture.

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The methodology applied managed to achieve the main research goal, which is introducing a practical way, in collaboration with local inhabitants, to save the deteriorating desert vernacular architecture. It is important to mention that the full results of applying the PAR method can only be fully appraised after the repercussions of the project in Balat town have been investigated with regard to its ability to meet the inhabitants' current needs. In this context, it is appropriate to stress that building the sample room succeeded in giving the locals a chance to build according to the vernacular knowledge of traditional dwellings, as well as to develop new methods. Another benefit from this research was that a desert vernacular model house was constructed using a PAR method that engaged the local community throughout the design and building phase and managed to made use of local know-how. The physical model house was a tool for investigating the needs of those living in contemporary desert vernacular houses. The model house was constructed based on an understanding of desert vernacular architecture as well as of the urban fabric and building technology. One of the more significant contributions of this study is that the methodology followed is flexible; this provides an opportunity to define a methodological approach that can be useful for many different desert vernacular communities suffering from the same or similar problems. The documentation of this research work was transformed into a popular science book and a copy was sent to the local inhabitants in Balat town. Now after a year since the room sample was built, local inhabitants managed to finish the house bit by bit. It is now used by the local NGO as a small museum for traditional crafts in Balat.

Desert vernacular settlements are a precious heritage that must be conserved and retained. However, I believe that understanding past vernacular practice is also a tool for improving the present and future. This belief was the driving force behind my research work. Balat and other similar desert towns need further research active work before they are reduced to a memory of a place.

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Notes

1. Project report published by National Organization for Potable Water and Sanitary Drainage (NOPWADA), July 2007, Egypt infrastructure improvements project, secondary cities environmental assessment; Environmental assessment report for the New Valley Governorate; El Mounira and Nasr El Thowra villages, Kharge oasis, Balat, El Gedida and Tanhidah villages in Dakhla oasis.
2. Using Stake's inclusive definition for case study: 'A case study is defined by interest in individual cases' (Stake, 1995, p. 236).
3. This approach is considered the national strategic plan for Balat's future development until 2027 developed in 2008 by the Egyptian Ministry of Urban Planning in discussions with the local authorities and local inhabitants.

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4. Sibbet discussed in his book that, based on his experience, visual aids had proven to be the most proper way to approach dwellers in local communities as it facilitates understanding of the information, increase dynamic participation and encourage the engagement of locals in discussions (Sibbet, 2010).

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