THE KERKENES ECO-CENTER

A REPORT ON THE 2002 PROGRAM

Figure 1: Team and sponsors of the Kerkenes Eco-Center.

THE KERKENES ECO-CENTER

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The Eco-Center was founded on the base provided by the Kerkenes Project that started in 1993 as the archaeological survey of an ancient city and is now a well-established multi-disciplinary research project run from the Faculty of Architecture at the Middle East Technical University (METU). The archaeological survey at Kerkenes, directed by Geoffrey Summers and sponsored by the British Institute of Archaeology at Ankara, and the post fieldwork multidisciplinary study carried on in METU, have produced results which have been internationally recognized. Geoffrey Summers was chosen as one of the Associate Laureates of the 2002 Rolex Award for Enterprise:
(http://www.rolexawards.com/laureates/laureate2.jsp?id=0074).

Summer 2002 was when action began... Too much effort and resources are usually spent on feasibility studies and discussions while nothing gets done. The Kerkenes Project decided to start with action and, thanks to a Grant awarded by the Australian Embassy, the first activities of the Kerkenes Eco-Center were initiated during the 2002 summer months. A parallel study of 'Environmental Performance of Buildings', funded by a British Council Partnership grant between the Architectural Association (London) and the Department of Architecture, METU, was an opportunity for students to get involved in activities related to the new Eco-Center venture as case studies were chosen from the village of Şahmuratlı.

Figure 2: The Kerkenes House and facilities with the village of Şahmuratlı in the background.

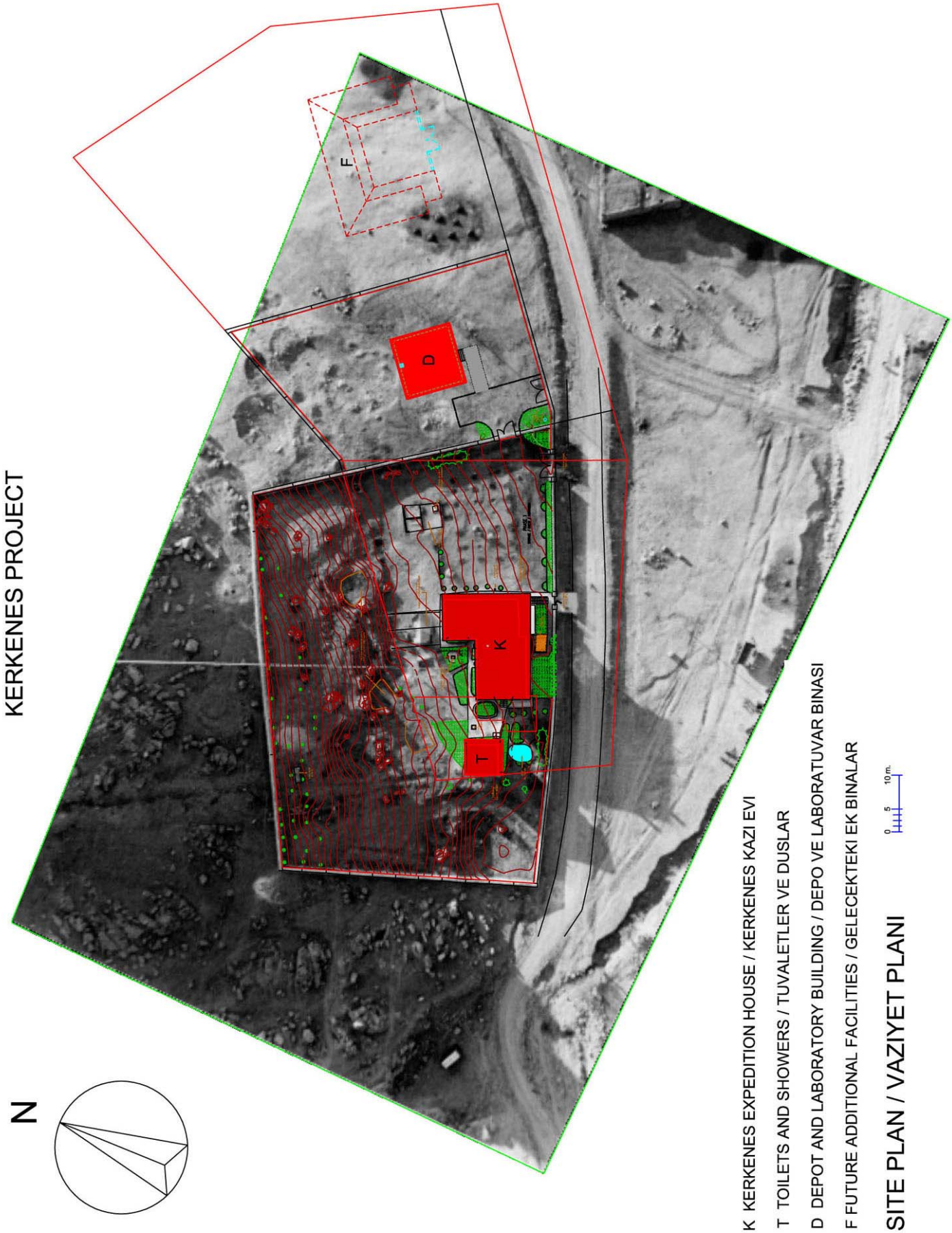

Figure 3: Site Plan showing the Kerkenes House superimposed on a balloon photograph.

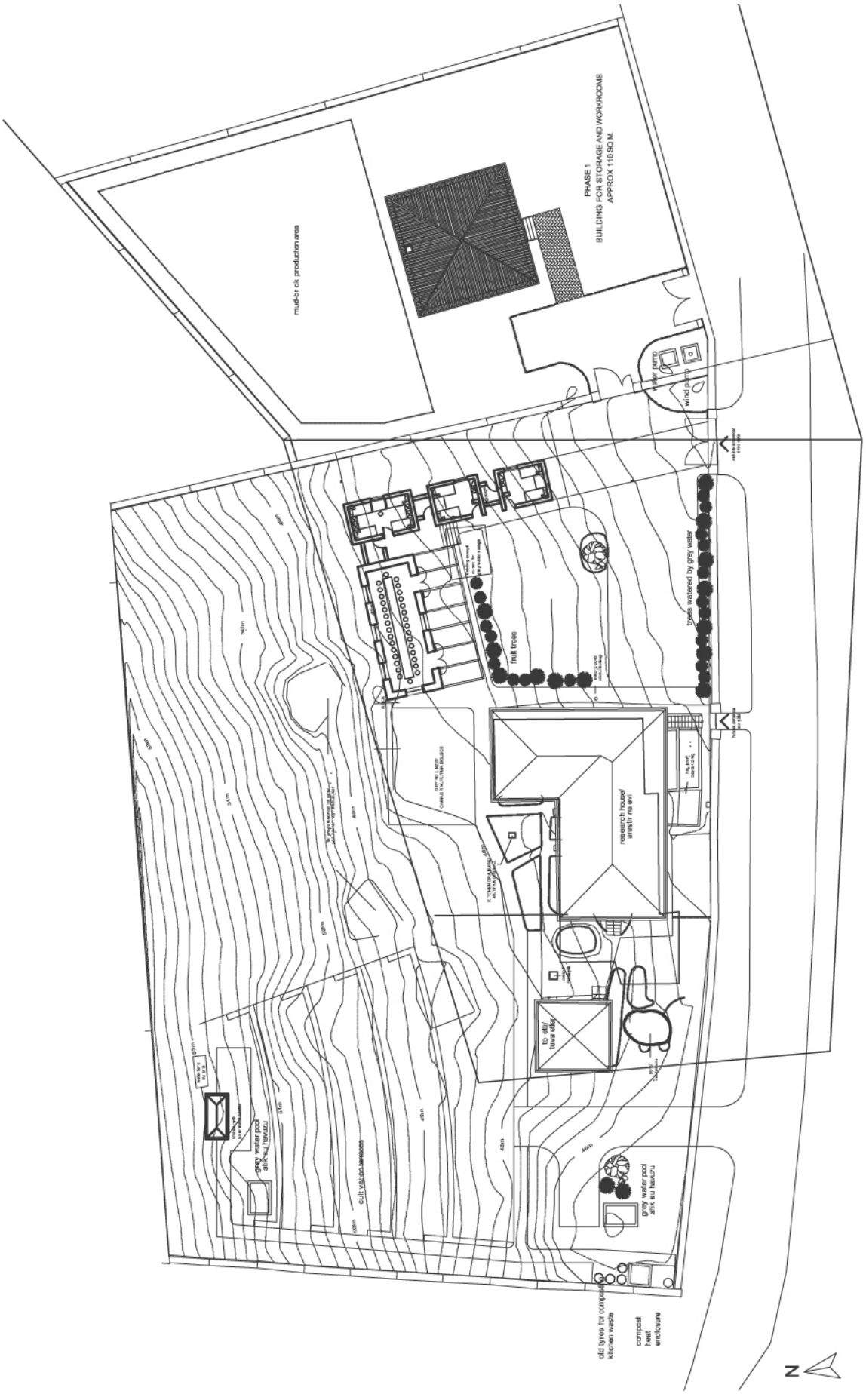

Figure 4: Site plan showing preliminary proposals for the Kerkenes Eco-Center activities.

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The efforts put into developing the Kerkenes Eco-Center involve the villagers of Şahmuratlı as well as staff and students from METU. The villagers benefit directly from the results and the project will be a means of spreading, through an educational institution, knowledge and convictions touching the important issues of environment and sustainability. The project also gives to interested staff and students from METU an opportunity to participate actively in efforts focusing on an environmental friendly way of life.

Project Activities

At the start of the project the activities chosen to be either priorities or nucleus activities around which further development can take place were:

1. Coring for water;
2. Installation of pump and simple drip irrigation system;
3. Reuse of grey water in the garden;
4. Separation of waste for recycling and composting;
5. Use of solar energy for water heating;
6. Purchase of a mud-brick press for improved and stabilized mud bricks;
7. Production of alternative building materials such as mud-bricks, strawbales and papercrete;
8. Participation of students from METU in building activities and related studies;
9. Involvement of students taking Arch 325 course, 'Architecture in-situ: Hands on Building';
10. Dissemination of information and results for publication on the web.

General aims and objectives

The general aims and objectives of the project concern a wider proposal which it is hoped can be pursued over the coming three or four years. The above activities are designed to act as a catalyst and set an example to be followed by villagers from Şahmuratlı and the surrounding region. The aim and objectives focus on the welfare of the Şahmuratlı Village and provide an opportunity for the development of a viable and sustainable framework and organization which will allow the activities proposed to become self-supporting in the long term. Activities will be initiated by the Kerkenes Eco-Center Project but, once firmly established, it is anticipated that the Eco-Center would become self-supporting and largely run by the local contingency.

The first grant for the Kerkenes Eco-Center was awarded by the Australian Embassy and funded the water coring, grey water and garden activities. The drip irrigation scheme, including the reuse of grey water, composting, the wind pump, are all installations chosen to demonstrate the viability of the proposed activities.

Other activities related to building materials and studies on the environmental building performance were also initiated through the participation of METU students and the British Council Partnership grant. Experiments with alternative building materials and a study of the results will be the first step in the construction of facilities for the Eco-Center. Activities will give an opportunity to students to have 'hands on' experience on which to base their studies.

Finally the Kerkenes Project itself was able to demonstrate that renewable energy was the way forward by installing the first solar water heater in the village.

Figure 5: Terracing the Kerkenes Eco-Center kitchen garden.

Kitchen gardens

Small scale family kitchen gardens are a familiar scene in the village but complaints about the lack of water during the summer months are often voiced. Several families have drilled deep boreholes, up to 22m in depth, into the granite, with varying degree of success. During the summer 2001, while villagers tried to tap additional sources of water to the large village water tank, a tragic event took away two young lives.

Hydrology studies

A detailed study of the hydrology in the village area would help future developments but some knowledge has already been acquired after the visits of geologists, Mehmet Ekmekçi from Hacettepe University and Tuygun Savacı from the Köy Hizmetleri. It is clear that, at best, the level of the water table can be only a few meters below the ground surface but will drop down during dry summer months. The advantage of the deep core is that water seeping down through the cracks in the granite remains clean but seepage is often too slow against demand. Wells, of 1 to 2m diameter, tapping a greater quantity of water from the permeable geological layer above the granite, seem to yield a greater quantity of water but increasing demand should be monitored to ensure that the water table does not drop too dramatically.

Water and pumps

The Kerkenes Eco-Center, phase one, with the help of the Australian Embassy, tackled the water problem by investing in a deep borehole. A first trial within the project plot of land was found to be too hard to drill although at least 2m of water seeped in the 7m deep borehole. Although drilling was abandoned, a hand-pump was installed for occasional use. Water will be tested to determine if it is fit for drinking. Passers by will be welcomed to use this modest source of water and a small trough for animals to drink from will be built.

Figure 6: The first drilled hole, 7m deep, was found to produce about 2m of water and a hand pump was installed for occasional use.

The second deep core was located a hundred meters in front of the house, by the streambed, within the plot belonging to Dr. Sevket Bağçi, who very kindly gave us permission to drill on his land. At this location a 12m deep layer of sediment was found on top of the granite. A total of 17m were drilled using 16cm diameter corer when the granite was reached.

Once drilling was completed and the borehole cleaned by the Sorgun Fire Brigade, to whom we extend our thanks, the submersible pump was lowered down and connected to a switch panel controlled from the house balcony. An electrical switch allows water to be pumped down to a certain level and then cuts off automatically. A pipe brings water up to the existing water tank systems on the hill behind the house. Water can then be used under gravity without further pumping.

Wind pumps, which would demand an investment of $1,500 to $3,000, are envisaged in a future phase of the project but as an immediate alternative the electric pump is being used and will allow preliminary results for the evaluation of different techniques and problem resolution. It is also clear that such an investment cannot be contemplated by most of the villagers but through cooperation and a possible common scheme families might get together to invest over a period of 3 to 5 years a sum that would allow one wind pump to be purchased every year.

Figure 7: The drilling activities attracted our good neighbors, curious to see how much water would pour out. The drilling machine cored down to 17m into the granite, after which it was decided to stop.

Figure 8: Any loose sand and small gravel needs to be washed out of the drilled hole so as to avoid clogging of the pump. The Sorgun fire Brigade willingly came to help us with that task!

Figure 9: Job done! The drilling lorry is ready to leave.

Figure 10: The pump was lowered into the drilled hole and a protective box placed on top. The electrical control panel is on the balcony of the Kerkenes House.

Figure 11: A buried pipe connects the pump to the existing house water tanks sitting on the hill behind the house. Water can then be gravity fed for use in the house and garden.

Irrigation techniques

Once water is available, its use has to be as controlled as possible. Drip irrigation is a well-known technique that does so but the commercially available systems are also beyond the villagers means. An alternative was set up with relatively cheap plastic pipes in which holes have been punched. The system works and even if control is not as sophisticated as with systems available on the market, it has been found to be economical of water. It was unfortunately already too late in the season for the system to be fully tested and the yield of vegetables to be quantified but hopefully summer 2003 will tell the tale.

Figure 12: A perforated looped pipe is leveled, using a water cover, and then buried,

Figure 13: Old car tyres were used to build the retaining wall of the garden terraces. The water tanks used are seen on the level above.

THE GREY WATER SCHEME

Figure 14: Settling tank, part of the old washing machine that caught fire, was lowered into the trench and connected to the bathroom plumbing.

Reuse of grey water

Water used for domestic purposes can be salvaged and reused in the garden. This is in line with a general approach of reuse and recycle but demands a conscious effort on the part of all. Detergents will be very harmful if used and only mild soap or biodegradable products must be discharged into the system. Use of 'Arap' soap rather than detergent to wash up greasy plates and pans from a household of thirty people proved to be impractical and, because bio-degradable soap is not available locally, it was accepted that the kitchen sink would continue to be drained into the cesspit but that the rest of the used water from showers and washing machines could be channeled into the garden irrigation system.

The unfortunate fire inside a very old washing machine was an excuse for us to recycle scrap and use the central drum as the settling tank that was needed! The second settling tank was a simple thick plastic container that had once stored one month’s worth of cheese... The grey water system was connected to the home-made version of the drip irrigation system watering grass and trees in the lower part of the garden. Although grey water is perhaps not ideal for vegetables, plants such as corn and sunflowers should thrive under such treatment and we intend to demonstrate this next summer.

Figure 15: Plumbing in the bathrooms was altered to divert the shower and washbasin waste water to the grey water system.

Figure 15: A new drain was added to the shower but the existing one kept so that a choice can be made if necessary.

OTHER ACTIVITIES

Alternative building materials

Mud-bricks

Traditional building materials are rapidly being replaced by what are perceived as more convenient and modern materials. The advantages of these indigenous materials are too often overlooked. Studies done under the scope of a British Council Partnership Grant between Middle East Technical University, with Françoise Summers, Nevin Gezer and Defne Ülgüray, and the Architectural Association in London, with Simos Yannas and Yasemin Somuncu, focused on examples of houses in the village. METU students, Aytaç Akkan, Tuğrul Karagüzel and Semra Arslan, participated in the study, collecting data, gathering information from the villagers and monitoring some experimental building activities.

Figure 16: Mud, straw and a simple wooden frame is all that is needed for the production of mud-bricks.

Figure 17: Two villagers producing mud-bricks on a sunny summer day.

Recycling bottles and cans

Empty bottles and cans used at Kerkenes were not thrown away but kept for recycling. The garden wall was heightened at one end to prevent aggressive dogs from jumping into the rabbit enclosure. This was a good opportunity to show that cans and bottles can be used as alternative building materials.

Figure 18: Building with glass bottles and mud mortar.

Figure 19: Building with cans.

Papercrete

Papercrete is made of paper, sand and cement. Adobe can also be used and different materials need to be tested so as to adjust consistency and proportions to suit the needs.

Figure 20: Children helping to tear newspaper

Figure 21: It's fun to mash paper!

Figure 22: The 'mush' being poured into the wooden frame.