basin–South Asia

Regional Knowledge Platform

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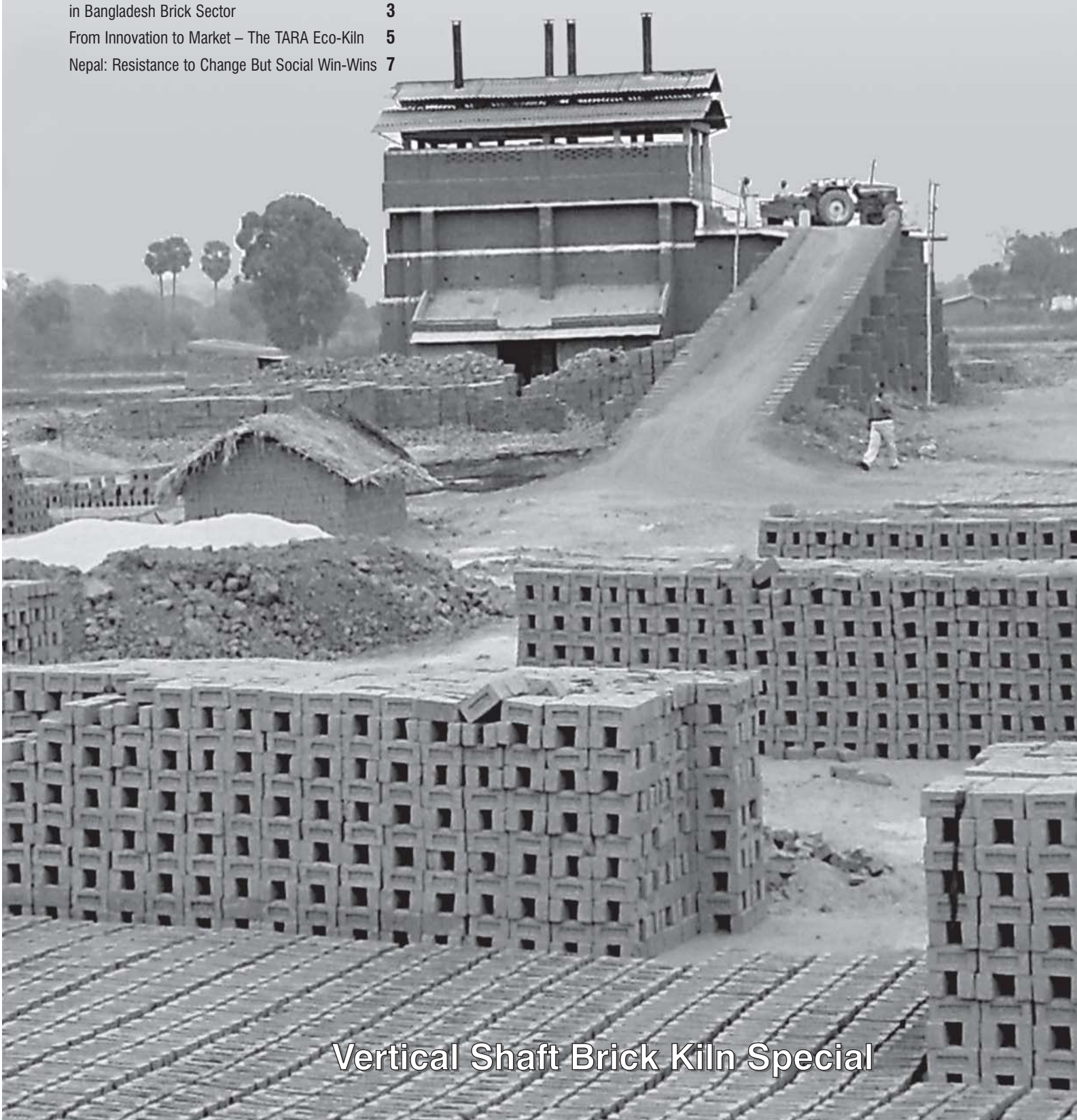

Vertical Shaft Brick Kiln Special

Editorial

Curbing Carbon Emissions: A Window of Opportunity

Buildings and the construction sector account for over twenty percent of CO_2 emissions. There is a wide spread belief that the built environment offers the largest and least cost option for curbing carbon emissions at the global level. Greening efforts so far have been directed towards energy conservation in operations of buildings. Worldwide; corporations, Governments and organizations have begun intense search for green building materials and clean production technologies with a special emphasis on improving the SME sector. The brick and its manifestations, and brick production technologies have commanded most attention worldwide during the last decade.

The Vertical Shaft Brick Kiln (VSBK) technology is perhaps the most energy efficient brick firing technology in the world. Its performance surpasses the modern, computer controlled tunnel kilns widely used in industrialized developed countries and currently being marketed aggressively in emerging economies. The refinement and development of the technology was pioneered by Swiss Agency for Development and Cooperation (SDC) through a multi partner global environment programme initiated in India in 1993. The VSBK technology achieves carbon emissions reduction of 2800 tons per million bricks. The successful UNFCCC registration of the VSBK India Cluster Project is a testimony of the supreme green credentials of the technology.

The challenge for transforming the Indian brick industry is daunting. The Indian brick industry is a large unorganized sector employing millions of workers, consuming millions of tons of coal, biomass and soil resources. The conservative nature of the industry makes it resistant to change even though the potential for improvements and curbing carbon emissions is immense. India currently produces over 150 billion bricks per annum. The VSBK technology is firmly established in India with about 100 operational kilns. Currently, the technology is commercially marketed in India as the TARA Eco-Kiln by TARA Machines (www.taramachines.com).

With humble beginning in India, SDC and its partners have lead the charge for proliferation of the technology to Nepal, Vietnam, Pakistan, Afghanistan and introduction of the technology in South Africa is slated for early 2010. The World Bank in collaboration with the Bangladesh Government has initiated a technology transfer project to Bangladesh with installation of the first unit under way with technical support from Technology and Action for Rural Advancement (TARA). Countries like Cameroon and Cuba are in the pipeline for adopting the technology.

Continuous innovation has been the key in achieving momentum for positive change. In India, use of industrial waste and carbon bearing residues in brick making holds promise. In Vietnam, mechanization of the brick forming process which also introduces cavities (holes) has resulted in further reduction of coal and net emissions. The innovation is ideally suited for wide scale adoption. There are intense efforts under way for chemical catalysts and additives that improve combustion efficiency, increase profits and curb emissions. The humble brick holds promise for achieving low carbon economic growth in the years ahead.

Dr. Arun Kumar
President
Development Alternatives

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TARA Eco-Kiln at Jharsuguda, Sundergarh, Orissa, by Dr. Soumen Maity

Focus

Introducing Cleaner Production Practices in Bangladesh Brick Sector

Notwithstanding the advent of alternate building materials, burnt bricks are and will be the most popular building material in Bangladesh. In Bangladesh, fired clay bricks form a significant portion of the materials used in the construction industry. Currently there are approximately 4140 brick making units in Bangladesh producing around 12.4 billion bricks annually. Apart from soil; approximately 2 million tonnes of coal is also being used in the brick industry, accounting for 7.3 million tonnes of CO_2 emissions. Almost all the coal used is imported from neighboring India, thus draining out a substantial amount of foreign reserve. The brick industry has a big contribution to the economy and is a large provider of jobs contributing around 1% to the economy.

In this context, realizing the need as well as a strong potential for introducing energy-efficient, cleaner technologies and practices in the Bangladesh brick sector, the Department of Environment (DoE), Government of Bangladesh is working closely with experienced international and national consultancy organizations in introducing cleaner technologies and practices as part of the Clean Air and Sustainable Environment (CASE) Project which is being administrated by The World Bank.

Practical Action, Bangladesh in association with Development Alternatives, India has been piloting introduction of cleaner production and practices in the existing fixed chimney BTK's in Dhaka, Bangladesh. As a part of this initiative various technologies were identified and presented to Government of Bangladesh and entrepreneurs. Awareness visits and feasibility study were also conducted. It was expressed by entrepreneurs that improvements in the Bangladesh brick industry have to be in two fronts. Besides introduction of new technologies e.g. VSBK; initiative also needs to be taken up on improvement of existing technologies e.g. FCK. The latter was identified as the most important and immediate need from the context of Bangladesh brick industry.

The need of improvement of existing technologies, resulted in identification and demonstration of use of internal fuel and better feeding and firing practices in fixed chimney BTK's. Pilot entrepreneur was selected through an extensive and elaborate process with due consultation with all the major stakeholders including the Bangladesh Brick Association. Results from the pilot demonstration initiatives have shown an enormous potential of replication. To achieve an enhanced profitability of around 20% from reduced coal and labour savings nominal investments are required. Savings in environmental emissions are also appreciable. Entrepreneurs are interested in adopting the same due to enhanced profits and compliance with environmental standards. Scales of investments are also nominal since the demonstrated methods can be retrofitted in the existing brick production system in an incremental manner. Regulatory agencies are interested in enforcing the same since environmental compliance are maintained with.

The most attractive opportunities in terms of various stakeholders are as follows:

1. Environment
a. Reduction in CO_2 emission
b. Enhancement of resource efficiencies
2. Brick workers
a. Improved working conditions
b. Safe and healthy work environment
c. Enhanced income opportunities
3. Entrepreneurs
a. Higher returns on investment
b. Business security and lowering of risks
c. Compliance to rules and regulations of Government
4. Regulatory agencies
a. Help in curbing pollution in the brick industry
b. Assistance in defining environmental performance standards
c. Savings in foreign reserves

In Bangladesh there are around 4000 authorized FCK. The annual coal consumption is around 2.2 million tonnes. If around 50% of the existing units adopt improved technologies, then it would result in:

- Saving of 220,000 tons of coal annually
- Saving of 750,000 tons of GHG emissions annually
- Saving of 17 million USD foreign reserves annually

Thus quantification of hard benefits is simply enormous.

New approaches to operational practices requires a paradigm shift from the conventional practices and the mentality of conducting regular business thereby integrating the whole process innovations with new technology process and re-engineering of existing methods. Change in mentality, technology innovations and trained human resources are the most valuable asset of improving the environment and benefiting the society in a business like manner. However the advantage of all this can only happen if the work force is ready to change its mind set and working habit. All this requires extensive awareness, widespread demonstration; intensive training and long term technology support and making both workers and entrepreneurs learn, practice and adopt improved technology options.

The above is the key to the success of the pilot initiatives and can only be achieved in time. In the absence of learning, the work force simply repeats the old practices and therefore, continuing learning and commitment to re-learning are crucial for overall improvement in the brick sector especially with regards to energy conservation, minimizing pollution and better quality of brick.

These are some of the initiatives which Practical Action, Bangladesh and Development Alternatives, India will be jointly working up in Bangladesh. These trials have an enormous potential of replication in various Asian countries e.g. Nepal, Afghanistan, Pakistan, Sri Lanka and other places where Bull's Trench Kiln firing practices is still being followed.

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LOK AWAAS YATRA

A Journey to Promote Eco-Habitat

Announcement of the next Yatra

Lok Awaas Yatra – Eastern Region

26th–30th March 2010

The **Eastern Region Lok Awaas Yatra** is scheduled for **26th – 30th March 2010** in the eastern regions of India covering **Bihar and Orissa**. It will conclude in a regional seminar at Patna on 30th March 2010 that will identify key enablers for enhancing the quality of rural habitats in the eastern region.

The eastern region Yatra is the third in the series of Yatras being organized by basin-South Asia. The second regional yatra from 17th - 21st January 2010 was successfully completed in the western region of India covering Kutch, Rajasthan and Saurashtra. The three trails culminated in a knowledge sharing and learning regional seminar at Centre for Environmental Planning and Technology (CEPT) on 21st January 1010. The first regional Yatra was conducted from 17th - 21st January 2010 in Central India covering Bundelkhand, Vidharbha and Marathwada. The regional seminar at Bhopal on 12th September 2009 enabled identification of key issues for enhancing the quality of rural habitat in the region.

Lok Awaas Yatra is a nationwide capacity building initiative for local governance institutions and implementing agencies at the grassroots level. The main objective of the Yatra is to create awareness and disseminate strategies for sustainable habitat development through dialogue, networking and knowledge sharing in a Yatra mode.

Report

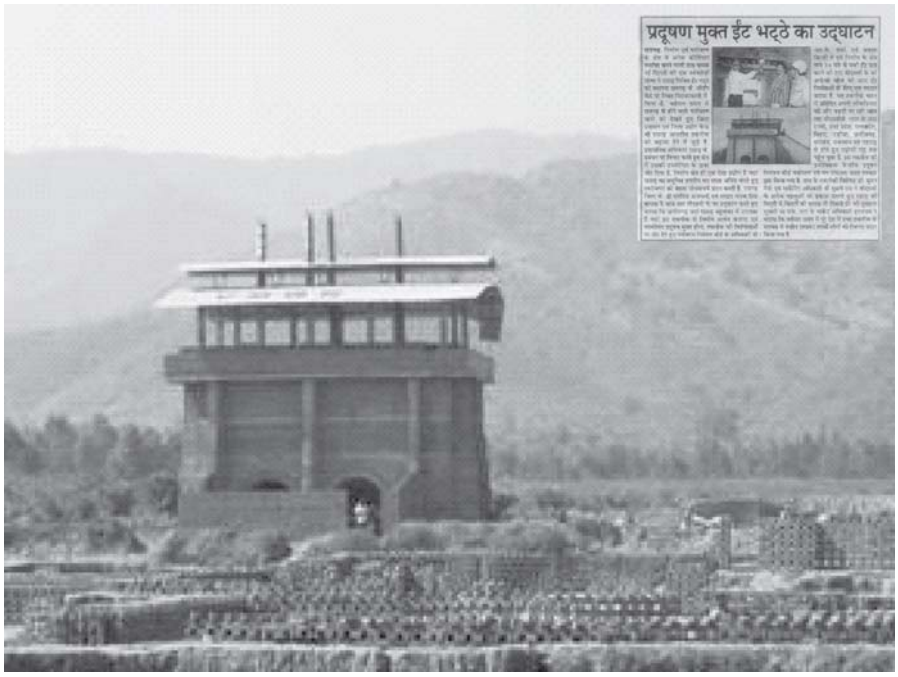
From Innovation to Market
– The TARA Eco-Kiln

Rising demand in energy consumption in India has led to over exploitation of its fossil fuel reserves. The worst affected is the increased use of coal in the brick industry. Alarming situations are predictable with no feasible solutions in the near future. Significant opportunities exist through clean technology interventions to reduce coal consumption, thereby enhancing India's energy security. Technology and Action for Rural Advancement (TARA), a constituent establishment of the Development Alternatives Group has been working towards making available comprehensive technology packages to the Indian brick industry catalyzed through favourable policy initiatives and increased access to finance and carbon credits.

Background

India is the third largest consumer of coal after China and US. Out of this, the brick sector is the highest consumer of coal (12.6% equivalent to 60 millllion tonnes per year) after power sector. In India approximately 160 billion bricks are produced per year generating revenues of 5.2 billion USD. With over 140,000 small scale manufacturing units; it provides direct employment to over 8 million workers. Traditional firing technologies presently followed, release more than 170 million tonnes of CO_2 every year. With the increasing pace of industrialization consumption of bricks is slated to reach the 200 billion mark by 2012.

Realizing the need of alternate technologies especially in the brick sector, TARA has been pioneering the demonstration of Eco Kilns in different parts of India. Eco Kilns are the most energy efficient and environment friendly brick firing technologies available. Improved product quality and higher profitability achieved through a coal saving of 180 tonnes/million bricks' has created interest amongst brick entrepreneurs all over the country.



The Technology Innovation

Eco-Kiln in India was launched in 1995 by Swiss Agency for Development & Cooperation (SDC) as a project on introducing sustainable production systems for building materials. The main objectives were to assess the potential, demand, economic viability, energy efficiency and eco-friendliness in Indian context. From the lessons learnt through international experience, from the very beginning Chinese experts were associated for complete technology transfer including capacity building of local masons, firemen and engineers. Indigenous capacities were built up to design, construct and operate new kilns in a commercial mode. Various innovations were made to suit Indian conditions. The kiln structure was changed to accommodate higher platform stacking capacity. Civil super structure was modified to withstand higher load on the platform. Design changes in the loading platform ensured better working conditions. Innovations in equipments ensured also easier operation. The most drastic changes made were on the adoption and modification of exhaust systems. This ensured a considerable reduction in emissions monitored by external agencies and resulted in setting of new emission standards.

Technology Incubation

Based on experiences from neighboring countries, it was decided at the outset to

promote Eco-Kiln as a small capacity, flexible technology. The Eco-Kiln production units delivering 10,000 bricks per day could never be a substitute to the large scale fixed chimney BTK's producing between 40,000 to 50,000 bricks per day. Thus dissemination emphasis was given in areas having proliferation of clamps and small scale movable chimneys. For efficient technology transfer, multiple anchors of the technology were put into place primarily to:

- Reduce the risk of a single institution monopolizing the technology.
- Reduce the risk of failure with respect to technology transfer.

The provision for furthur research effort in the form of an established "Eco-Kiln Research and Development Centre" in Datia, Central India was ensured to cater to the evolving needs of the brick industry.

Taking Technology to the Market

Within a span of 10 years (2000 – 2010) more than 160 Eco-Kiln's were established in a commercial mode throughout the country especially in the Central and Eastern states. The qualities of bricks were accepted in the market at a premium. Most of the entrepreneurs were satisfied with the flexibility and performance of the kiln. This was reiterated by the increasing investment in selective mechanization and capacity augmentation. Although there might be skeptical views across many circles about the market penetration considering the potentials, however it is still a considerable achievement looking at the unorganized and rural nature of the Indian Brick Industry.

The basic attributes of commercial technology transfer are the following:

- Technology promotion in a commercial mode through business entities and not through project support
- Change in mentality from "Subsidy and Grants" to "Loans"
- Establishment of commercial support service providers
- Policy support to drive changes through State and Central Governments.

To create favourable conditions for a stable responsible business, TARA adopted an overarching strategy of **Capacity Building** to facilitate a collaborative balanced relationship between different stakeholder interests. A stakeholder network involving brick associations, regulatory agencies, and policy makers enabled to exercise positive influence in changing entrepreneur behaviour to conform to emerging environmental legislation. In contrast to threats of closure, the entrepreneur were confronted with technological and business solutions that were customized to the market and livelihood needs of the brick worker community responding to tightening environmental norms.

Similarly efforts were also directed towards strengthening supply of skilled manpower in the brick sector and business interests of market based service providers thereby integrating business interests with environmental well-being. A network of business development associates, equipment and service suppliers were created and strengthened in promoting environmentally sound technology solutions. Focus was also directed to encourage the entrepreneur's business aspirations in making financial investments in new technology and leverage financial resources from institutional sources through favourable policies of the State and Central Government.

Thus demand creation was strengthened with delivery of solutions that reinforced business viability in the brick sector.

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Report

Nepal: Resistance to Change But Social Win-Wins

In South Asia, resistance to change is especially strong, as the conventional way of firing bricks is really rather profitable and requires no high initial investment. Although more modern kilns, and the VSBK in particular, do mean significant energy savings, they also require higher initial investment. This dilemma is similar to that of the energy saving lamp. There, the initial cost is higher but savings come through lower energy bills and a longer lifespan. Yet even in industrialised countries, people are shying away from these upfront investments.

It Began So Well: A 6-shaft Pioneer Kiln

In the Kathmandu valley in Nepal, the most polluting kilns – moveable chimney Bull's Trench Kilns – were banned because of unbearable local air pollution. More than 100 kilns had been in operation. One pioneering kiln owner responded to this ban with the construction of a 6-shaft VSBK, with reasonable success. With year-round operation, he has mastered the technology very well and sells the excellent quality bricks for a good price.

The pioneering 6-shaft VSBK near Kathmandu produces excellent bricks without pollution, all year round

Resistance from Traditional Brick Kiln Owners

However, operating modern kilns demands a revolution in management compared to the traditional brick kilns. The latter are well-known technologies, and the kiln owner does not have to know anything about firing. He can just hire migrantfiremen and labourers for the dry season and has basically to overlook the kiln once a day. His most important job is to look after the cash-box.

VSBKs, on the other hand, require a 24-hour operation involving several shifts and fixed investments such as owning the land. With a drying shed for green bricks, the kiln can be operated the whole year round. "But why should I bother to work the whole year round when I can make my money within SIX months", commented a brick kiln owner in Nepal. Nonetheless, the situation is changing in Nepal too, and many entrepreneurs in the Terai region are interested in adopting VSBKs.

BTKs (Bull's Trench Kilns) need less investment and are run by firemen from India

Social Programmes are a win-win

Major achievements have been made in Nepal on the social front, with over 20 Child Care Centres (CCC) having been established at different kilns. Many BTK owners, whilst refusing to invest in a VSBK, have gladly adopted the CCC concept on their kilns. This has proven to be a real win-win situation, providing benefits to the kiln owners as well. It makes indeed sense for all the over-200 families living for six months on a brick kiln: it is better for everybody if the children are looked after and learn something. If they hang around on a dirty brick kiln site, they can even fall into ditches and many child deaths had occurred previously.

Many kiln owners see a win-win situation in setting up a child care centre for the several hundred migrant workers

Regional Knowledge Platform

South Asia

Auroville Earth Institute aims to research, develop, promote and transfer earth-based technologies which are cost and energy effective.

Aga Khan Planning and Building Services, **Pakistan** works to improve the built environment through the provision of technical assistance and construction management services.

National Centre For People's Action In Disaster Preparedness, India striving to bring sustainable technologies to help people reduce their vulnerability against future disasters.

Coastal Area Disaster Mitigation Efforts, India is a network of twenty voluntary organizations working for disaster preparedness of Fishing Communities in India.

Exnora International, India works as a catalyst in bringing about local initiative and community participation in overall improvement in quality of life.

Grambangla Unnayan Committee, **Bangladesh** is a non-profit, non-governmental organization working for people affected by extreme poverty, exclusion and disease.

Maithri is supporting Panchayat Raj institutions for developing perspective plans on basic need fulfillment and natural resource management through capacity building processes.

Orissa Development Technocrats' Forum, India works to facilitate an effective rural housing delivery system through appropriate technologies and sustainable livelihoods.

Trust for Village Self Governance, India is a charitable trust focusing on local self governance in villages for creating sustainable employment through habitat development.

Practical Action, Bangladesh, Nepal & Sri Lanka work with poor communities to develop appropriate technologies in food production, energy, transport, shelter and disaster mitigation.

Swiss Agency for Development and Cooperation (SDC), **India** is Switzerland's international cooperation agency within the Swiss Foreign Ministry.

Secretariat

Development Alternatives is a not-for-profit sustainable development enterprise that designs and promotes programmes and products which, through the use of alternative technology, contribute to the enrichment of human life.

Gram Vikas, India is a rural development organization, working with poor and marginalized communities of Orissa since 1979 making sustainable improvements in the quality of life.

Unnati is a non-governmental organization working over the last 15 years for "civic leadership promotion and strengthening local self governance."

basin-*South Asia* Regional Knowledge Platform (basin-*SA*) is committed to *"developing knowledge systems and promoting collaborative action within South Asia to enable access by the poor to sustainable habitat and livelihoods."*