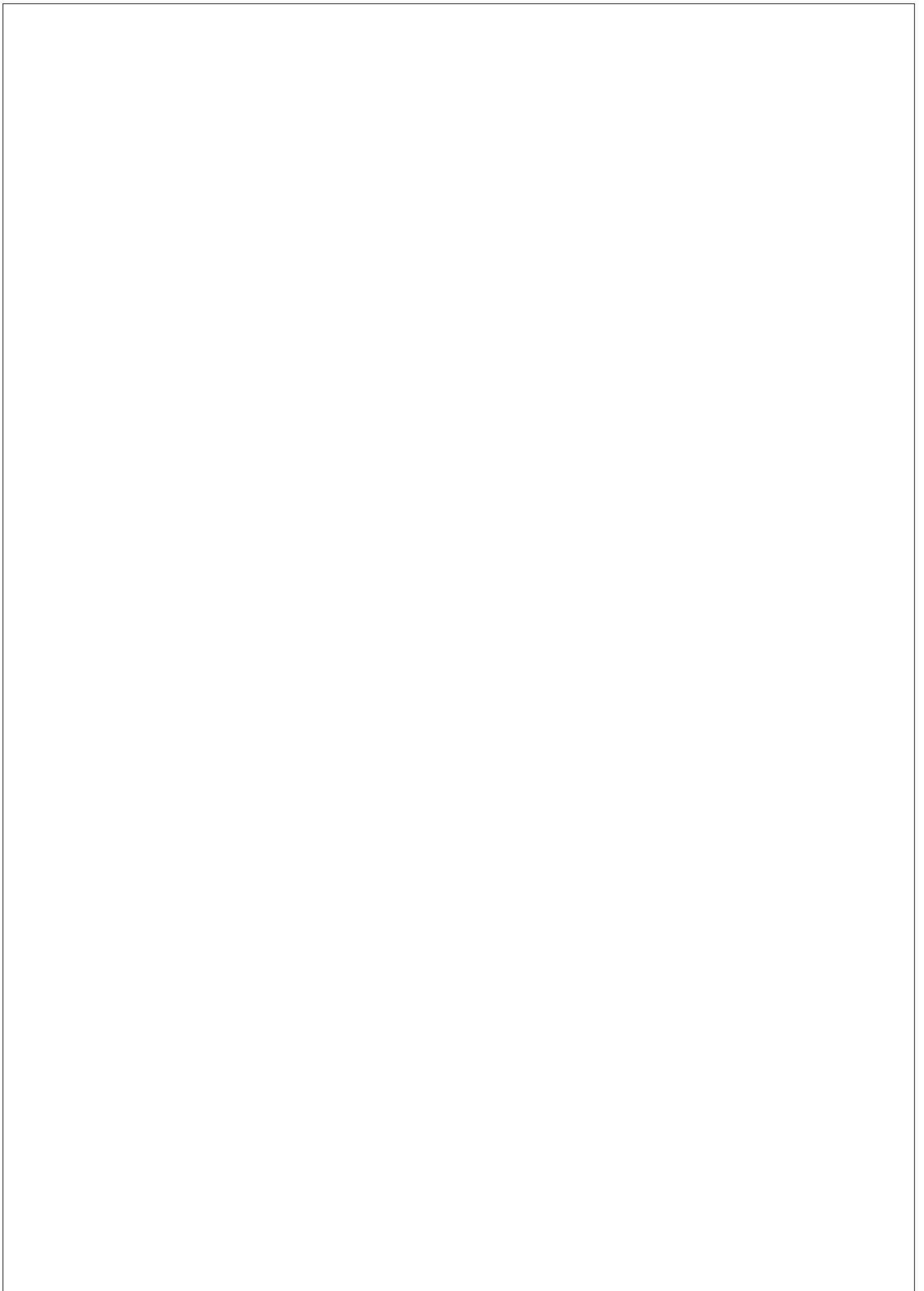


**Reconstruction of Schools  
and Basic Health Units in the  
Earthquake affected Area of  
Khyber Pakhtunkhwa Pakistan  
2006 - 2010**



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## **PREFACE**

On October 8, 2005, an earthquake that measured 7.6 on the Richter scale, the most devastating for a century in the region, destroyed entire cities and villages in Azad Jammu Kashmir (AJK) and in the Khyber Pakhtunkhwa (KPK, former NWFP), leaving more than two and a half million people homeless. Officials reported a death toll of more than 88'000 deaths and over 100'000 injured.

The earthquake's impact was spread over an area of 27'000 sq. km. In five districts of NWFP and four districts of AJK, public buildings, private housing, infrastructure, social services, livelihoods and businesses were largely damaged or destroyed.

SDC has been in charge of the construction of 90 schools and 5 Basic Health Units in the affected area Mansehra and Battagram. However, substantial funds have been contributed by other organisations, in particular UNICEF, which financed 56 schools. 14 schools were funded by the British Department for International Development (DFID) and one by the Swansea Foundation. Altogether, the costs for these 90 schools and 5 Basic Health Units amount approximately 1.9 billion PKR (approx. 22 million CHF). The joint efforts result in 12'800 students, boys and girls, having appropriate school facilities.

These facilities are a symbol for the solidarity between Switzerland and Pakistan. But these schools are also proof of the fruitful cooperation between different organisations, authorities and institutions. Shortly after the earthquake, the Government of Pakistan through the Earthquake Reconstruction and Rehabilitation Authority (ERRA) requested assistance from the Swiss Government for the national strategy of "Building Back Better" – and the Swiss Government responded swiftly and since then, a successful cooperation has been under way.

**Message from the UK Department for International Development DFID**

It gives me great pleasure to congratulate Swiss Development Cooperation (SDC) on the successful completion of its programme to reconstruct schools and health clinics to replace those destroyed by the 2005 Pakistan earthquake.

The UK Government funded 14 of these schools in Khyber Pakhtunkhwa Province, providing places for 1,120 girls and 1,600 boys.

Construction commenced in November 2009 and was completed by December 2010. The SDC project management team did an excellent job in a difficult security environment to deliver on time, under budget, and to a very high quality.

These excellent facilities are now transforming the lives of the communities they serve.

Many thanks and best wishes



George Turkington

Head of DFID Pakistan

United Nations Children's Fund  
Pakistan Country Office  
90, Margalla Road, F-8/2  
P.O.Box 1068  
Islamabad, Pakistan

Telephone +92 51 2097700  
Facsimile +92 51 2097799  
www.unicef.org

### Foreword from UNICEF Deputy Representative

The 7.6 magnitude earthquake that hit northern Pakistan in October 2005 killed almost 73,000 people and destroyed most of the infrastructures, including over 6,000 schools.

In the aftermath of the earthquake, UNICEF – with the support of donors and partners – committed to build 500 schools. A special aim has to not only get children back to school, but also to get other children into the classroom for the first time.

In this significant education project, UNICEF's largest partner is the Swiss Agency for Development and Cooperation (SDC). SDC has built 56 schools with 180 classrooms that directly benefit 7,000 children.

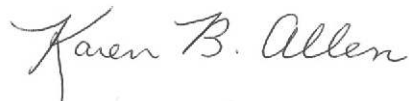
The collaboration between SDC, UNICEF, the Government and the community has been a special partnership to 'build back better'. This means schools are more resistant to future earthquakes; are more spacious and pleasant environments for children; and promote good hygiene through sanitary toilets and hand-washing stations.

SDC and UNICEF share a common outlook for the betterment of children's education in Pakistan. Education is a fundamental human right and every child is entitled to it. Education lays the foundation for growth, transformation, innovation, opportunity and equality. For children, education helps them to reach their potential and fulfill their dreams.

I would like to express my sincere thanks to the SDC, particularly the staff directly associated with this program on the ground, for their dedication to quality, timeliness, and local participation. SDC has been a trustworthy and reliable partner in working together with local people on site selection and quality construction to ensure local pride of ownership.

I believe this successful collaboration will be a model from which other countries can learn.

Thank you



Karen Allen  
Deputy Representative  
UNICEF Pakistan

## Education as a starting point to human rights

Education is both a human right in itself and an indispensable means of realizing other human rights. As an empowerment right, education is the primary vehicle by which economically and socially marginalized adults and children can lift themselves out of poverty and obtain the means to participate fully in their communities. Education has a vital role in empowering woman, safeguarding children from exploitative and hazardous labour and sexual exploitation, promoting human rights and democracy, protecting the environment, controlling population growth. Increasingly, education is recognised as one of the best financial investments States can make.

CESCR, General Comment no. 13, The right to education, 8 December 1999, UN Doc. HRI/GEN/1/Rev.6



Class room of a SDC built school



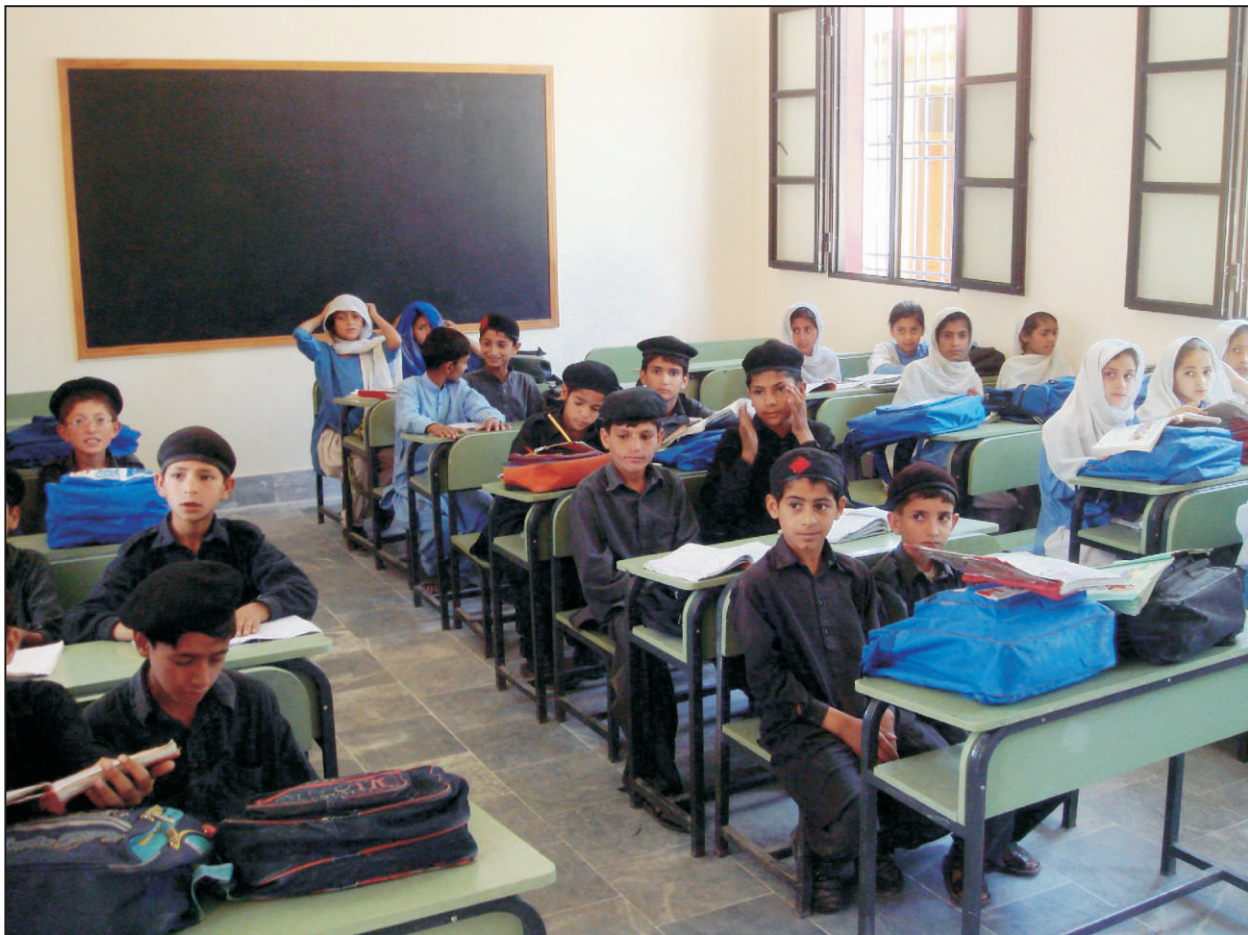
## A comparison

Some will object that universal primary education is an impractical and unaffordable goal. In fact, the achievement of universal primary education within a decade in all developing regions would cost only \$7 – 8 billion annually, over and above existing expenditure.

This represents:

- ...about four days' worth of global military spending,
- or seven days' worth currency speculation in international markets,
- or less than half of what North American parents spend on toys for their children each year,
- or less than the annual amount that Europeans spend on computer games or mineral water.

IHRIP/Forum Asia, Felix Morka, Module 16, The Right of Education



Gender mixed class

## Children excluded from education

Government reports under the Convention on the Rights of the Child have revealed no less than thirty-two categories of children particularly likely to be excluded from education. These are, in alphabetical order: abandoned children, asylum-seeking children, beggars, child labourers, child mothers, child prostitutes, children born out of wedlock, delinquent children, disabled children, displaced children, domestic servants, drug-using children, girls, HIV-infected children, homeless children, imprisoned children, indigenous children, married children, mentally ill children, migrant children, minority children, nomadic children, orphans, pregnant girls, refugee children, children without identity papers, sexually exploited children, stateless children, street children, trafficked children, war-affected children, and working children.

Katarina Tomasevski, Special Rapporteur on the Right to Education, Report, 13 December 2002, UN Doc. E/CN.4/2003/913



Rehearsal of maintenance instructions

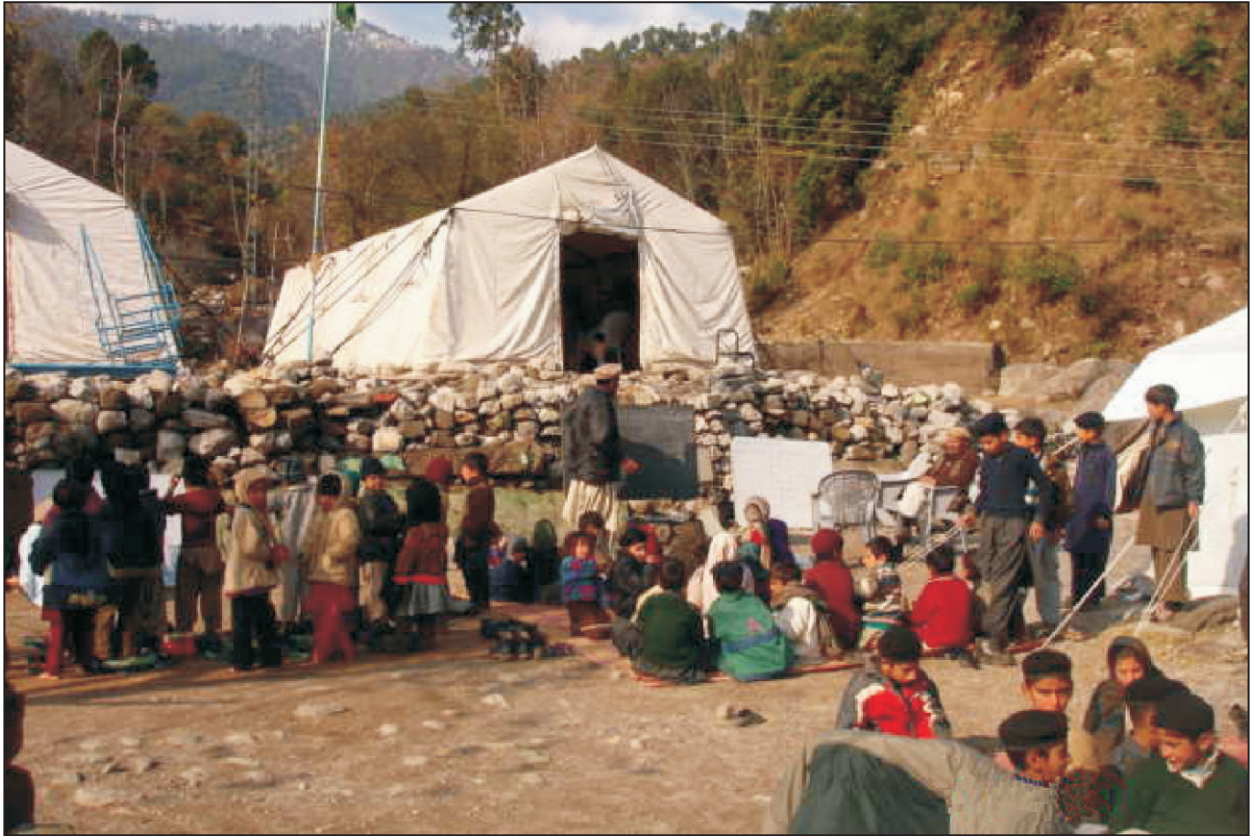
## RECONSTRUCTION OF SCHOOLS AND BASIC HEALTH UNITS

Only six months after the earthquake the relief phase was declared over and the Earthquake Reconstruction and Rehabilitation Authority (ERRA) proclaimed the beginning of the reconstruction phase. Following the relief operations, Swiss Agency for Development and Cooperation – Humanitarian Aid Section (SDC-HA) committed itself to assist the Government of Pakistan (GoP) in activities beyond Emergency Relief in the Districts of Battagram and Mansehra in KPK.

One of three basic action lines carried out through the Reconstruction and Livelihood Program (RLP) was the reconstruction of public infrastructure, in particular of Schools and Basic Health Units (BHU) in the two Districts. The school project is specifically referred to achieve universal primary education and eliminate gender disparity in primary and secondary education. All reconstruction and rehabilitation programs in the earthquake-affected area have been guided by the national strategy of “BUILDING BACK BETTER” and were coordinated by ERRA. ERRA has acknowledged that the structures built through SDC-HA commit the highest standards in terms of earthquake resistance, quality and durability.



A school destroyed by the earthquake (Photo by UNICEF)



Outside class at GPS Bamphora (Photo by UNICEF)



New class room at GGPS Buzbella



Examination of children at the new BHU Jabba



Taking blood pressure at new BHU Jaraid

## **PARTNERS**

### **GOVERNMENT OF PAKISTAN:**

**Earthquake Reconstruction and Rehabilitation Authority (ERRA):** All agencies engaged in the reconstruction process worked under the overall strategy and guidance of ERRA through a Memorandum of Understanding. ERRA retained the authority on decisions for allocation of building sites to donor agencies and issued NOCs (no objection certificates) once the designs were approved. NESPAK, a semi-public Engineering Consultant Company carried out the hazard assessment and approved the technical and structural design.

**Education Department:** The District line agencies played an important role coordinated by the District Reconstruction Unit (DRU) at local level. They were included in the planning process as they were the legal owners following the handing over of the completed infrastructures. DRU was supervised by PERRA (Provincial Earthquake Reconstruction and Rehabilitation Authority).

**University of Engineering and Technology (UET), Peshawar, KPK:** The Earthquake Engineering Department of the Faculty of the Technical Engineering at the University of Peshawar has been recognized as the leading institution in developing structural standards, model designs and building codes in Pakistan. UET continued to provide its consultancy services for the design/approval stage during the programme implementation. Through the Consultancy Cooperation agreement between UET and SDC-HA, the project was able to further improve and document and disseminate earthquake resistant construction standards and promote adequate building technologies and methods.

### **PARTNERSHIP WITH DONOR ORGANISATIONS AND NGOs:**

**UK Aid** from the **Department for International Development (DFID)** funded the reconstruction of 14 schools in KPK.

**UNICEF:** An implementation agreement for 6 schools has been signed on 15th December 2009. Recognizing SDC-HA's implementation capacity, the quality and the technically excellent standards of the structures UNICEF signed subsequently three amendments to the agreement for another 50 schools.

The **Australian Government, Aus AID**, the **Canadian International Development Agency**, the **European Union** and the **Koninkrijk der Nederlanden** funded UNICEF for this reconstruction programme.

**PWA Swansea:** PWA Swansea mandated SDC-HA to build 1 school on their behalf.

## **THE DESIGN, STRUCTURAL CONCEPT AND FINISHING STANDARDS**

The school design -based on a modular design-, was developed by the University of Engineering and Technology (UET), Peshawar and has passed SDC-HA's internal quality check. The Earthquake Engineering Department of the UET has been recognized as the leading institution in developing structural standards, model designs and building codes in Pakistan. UET continued to provide its consultancy services for the design/approval stage during the program implementation. Through the Consultancy Cooperation agreement between UET and SDC-HA, the project was able to further improve and to document and disseminate earthquake resistant construction standards as well as to promote adequate building technologies and methods.

All agencies engaged in the reconstruction process worked under the overall strategy and guidance of ERRA through a Memorandum of Understanding. ERRA retained the authority on decisions for allocation of building sites to donor agencies and issued NOCs (no objection certificates) once the designs were approved. NESPAK, a semi-public Engineering Consultant Company carried out the hazard assessment and approved the technical and structural design. One of the guiding principles of ERRA is that all stakeholders are involved during planning, implementation and construction, while selecting the sites and setting of priorities. Special emphasis was placed on community integration with the aim of fostering ownership of these infrastructures.

The presently approved modular design, quality and standards conform to UNICEF standards and international common practice. Jointly with the respective Department and ERRA the school sites were identified following a set of criteria, e.g. pre- and post student enrolment, previous existing structures, accessibility, requirements, feasibility etc. A balanced selection in respect of girl/boy schools ratio and geographical coverage have been considered and coordinated with other implementing agencies. Emphasis was given to primary school and girls education. Transitional or prefabricated structures were not part of SDC-HA's projects objectives as the commitment was made to build permanent and solid "Brick & Mortar" buildings with construction methods adapted suitable in the region.

In close cooperation with UET, 8 different modules were developed. With the combination of different modules theoretically any size of school could be achieved. Main difference between modules is the reinforcement design in the knots. Below are listed the different modules as:

1. One class room
2. Two class rooms
3. Two class rooms with teachers office
4. Two class rooms with teacher office L-shape
5. Three class rooms L-shape
6. Three class rooms with teacher office
7. Three class rooms with teacher office L-shape
8. Four class rooms with teacher office

A modular building is commonly done with two or three classrooms of 20 x 24 ft., one teacher office of 12 ft x 14 ft with storage space. Initially the class room size was 18' x 26'. After having the first eight schools built the size was modified to 20' x 24', which allows more possibilities to set the furniture (according the modus of teaching).

The covered veranda is 9' ft. in width. Separate sanitary blocks with 2 to 5 toilets and hand washbasins are built. Access to water is provided by connecting to existing water supplies/boreholes.

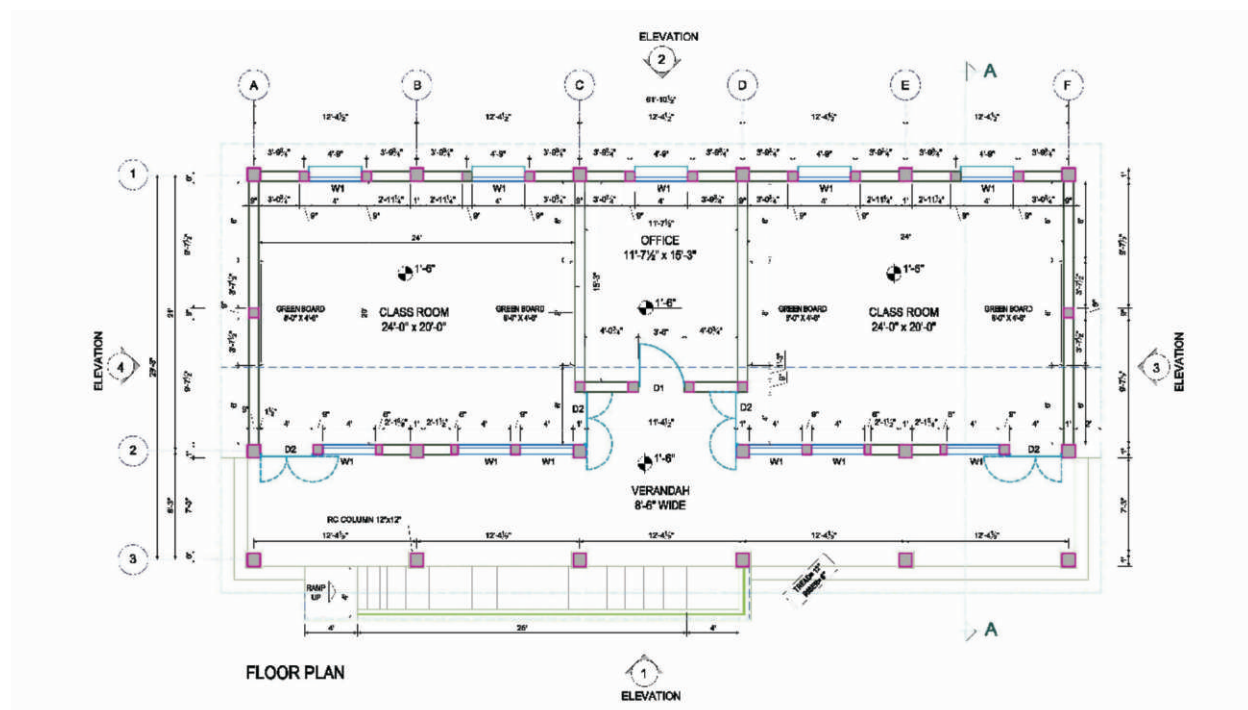
The main structure is a frame built in RCC with confined masonry on strip foundations and framed with plinth and bond ring beams. The roof is made with steel trusses and covered with painted/powder coated CGI sheets. The concrete floor finish is done in marble tiles. The walls are cement plastered, one side reinforced with embedded wire mesh, inside distemper/enamel, outside weather shield painted. Aluminium windows with splinter proof glass and safety grills are fitted. The doorframes are made in steel, the blade in Deodar wood and the suspended ceiling in Lasani wood. All rooms are equipped with electric lighting and ceiling fans.

The provisions of standard furnishings are double/triple seat benches for 40 students per classroom, green board on two walls, teacher's desk and furnished teacher's office, incl. storage. The buildings are lightning protected.

The school compound generally includes boundary walls, while the specific site development may require retaining walls, water supply, electricity connection, gates, flagpole and assembly ground. Tree planting is done where possible. The pathways and ramps allow for disabled access. All doors and one of the toilets in the sanitary block are wheelchair accessible.

Initially the class room size was 18' x 26'. After having the first eight schools built the size was modified to 20' x 24', which allows more possibilities to set the furniture (according the modus of teaching).

2 schools were built as two storey buildings (GPS Dharra and GGPS Argashori), for only limited space was available (for a certain period NESPAK objected two storey schools). All other schools are of a one storey configuration.



Typical floor plan of a school with two class rooms and teachers office





GGHS Talhatta, plinth beam construction



GPS Bari Maidan, brick wall construction



GGHS Charia, bond beam reinforcement work



GPS Andrasi, plaster work



GPS Shohal Najaf Khan, steel roof truss erection



GGPS Lang Sharif, class room

## **DISASTER RISK REDUCTION**

The assessment of the disaster risk reduction (DRR) potential of this project was carried out according to SDCs guidelines on DRR, and responds to the following key criteria:

1. The schools reconstruction is carried out within a high-risk earthquake zone. The structural design is based on a ground acceleration of  $ag_d=3.2\text{m/s}^2$  thus complying with international standards. Following the current rules of schools architecture in the area, the earthquake safety factor is further considered by constructing only single-storey buildings and concise shape.
2. The hazard risk assessment is carried out site-specific for each location and is based on desktop data (location of hazard zones, fragile fault lines etc.) as well as field inspection on site (e.g. landslide prone area).
3. The risk of students exposed to the consequences of an earthquake is minimized through behavior change and knowledge trained in lectures.
4. Aspects to natural resource management are considered by using locally available material, use of the same size of land available pre-earthquake, provision of rainwater catchments, septic tanks, soak away pits and use of locally adapted construction methods.

## IMPLEMENTATION

Aim of the project/program was the construction of total 90 schools by the end of 2010 or in other words, to meet the requirements of about 12'800 students in 318 class rooms. The quota of female students, - 124 class rooms allocated to 4'960 female students-, lays significantly above the average found in KPK province. The actual construction activities of the first phase started early October 2006 and lasted until the end of December 2010.

The life span of the low maintenance schools is 50+ years. An average size school of 3 -5 classrooms was completed within 6 to 7 months depending on site access, weather conditions and the contractor's capacity.

Besides constructing schools and BHUs, SDC-HA undertook at each facility courses in maintenance and earthquake preparedness for teachers and students. Posters containing maintenance and earthquake preparedness advises were distributed to each school, explained and posted in each class and teachers rooms.



Teaching Maintenance and Earthquake Preparedness at GPS Shugdar

## **QUALITY CONTROL**

Quality control was done on three levels:

### **Pre-construction phase:**

The school design developed by the UET has passed SDC-HA's internal quality check. NESPAK Engineering consultants mandated by ERRRA carried out the detailed and site-specific hazard risk assessment.

The modular design of all structures in terms of structural design criteria that require compliance with seismic standards has been approved by NESPAK. Following that, the site-specific "No Objection Certificate (NOC) was issued by ERRRA.

### **Construction phase:**

SDC-HA employed site engineers who conducted daily site visits following a set of defined quality check procedures. Accurate bill of quantities and working drawings have been developed along with available technical specifications and in line with common standards and building codes.

### **Post-construction phase:**

Contractor's defect liability period, joint inspections and handing over certificates as well as regular monitoring visits were standard procedures.

## **CHANGES OF DESIGN DETAILS**

During the construction period and later on the use of the facilities proved that some adjustments to the design would make sense for further projects.

On the structural level, gable walls which represent a significant mass, could be avoided by replacing the gabled roof with a hipped or even a flat roof. A flat roof designed as a concrete slab makes expensive steel trusses and suspended ceilings unnecessary and could as well be the carrier of an insulation layer. In addition proper formwork for ceiling slabs would make suspended ceilings superfluous.

The use of burned bricks for structural walls should be replaced with concrete blocks or mud blocks (depending on the area). Construction time could significantly be reduced, as blocks are of larger size, and the manufacturing process would result much environment friendlier.

Oil or distemper paint should be avoided and replaced with whitewash in order to reduce costs (which the Education Department will have to bear) and simplify maintenance in future.

A separate multi purpose/storage room should be included in the design.

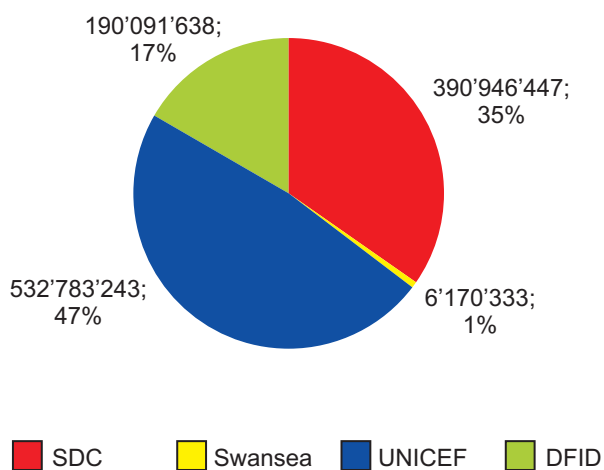
Sliding windows occupy less space (don't intrude into class room space).

Doors should be manufactured in steel, because the mostly unseasoned timber used causes warping. Furthermore, avoiding wood is a small contribution against deforestation.

## FINANCES

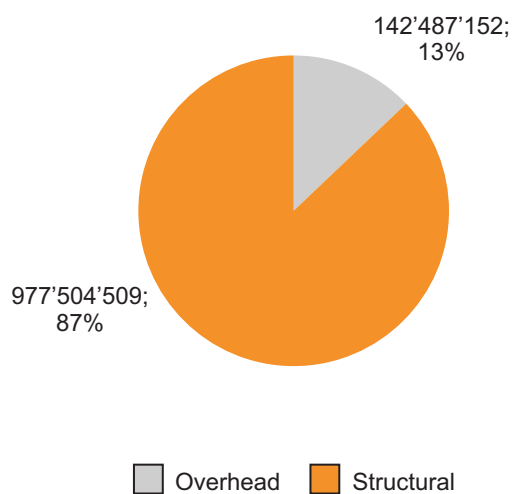
### Contribution of donors

SDC:	391,0 Mio PKR
Swansea:	6,2 Mio PKR
UNICEF:	532,8 Mio PKR
DFID:	190,1 Mio PKR
G of P:	Construction plots



### Investment yield

Overhead cost:	142,5 Mio PKR (spent in Pakistan)
Structural cost:	977,5 Mio PKR (construction, furniture, consultancy, etc. costs)







# PROJECTS

	Schools	Class rooms	Students	Male (61%)		Female (39%)	
				Class rooms	Students	Class rooms	Students
<b>Phase I</b> SDC # 1 – 18, 26 - 31	19	63	2'520	39	1'560	24	960
<b>Phase I</b> SWANSEA # 19	1	2	80	2	80	0	0
<b>Phase I</b> UNICEF # 20 - 25	6	20	800	12	480	8	320
<b>Phase II</b> UNICEF # 32 - 51	20	75	3'000	46	1'840	29	1'160
<b>Phase III</b> UNICEF # 52 - 76	25	71	2'840	45	1'800	26	1'040
<b>Phase I</b> DFID # 77 - 90	14	71	2'840	39	1'560	32	1'280
<b>Phase IV</b> UNICEF # 91 - 95	5	16	640	11	440	5	200
<b>TOTAL</b>	<b>90</b>	<b>318</b>	<b>12'720</b>	<b>194</b>	<b>7'760</b>	<b>124</b>	<b>4'960</b>

<b>Basic Health Units</b> <b>Phase I</b> SDC	<b>5</b>	Beneficiaries <b>70'356</b>
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