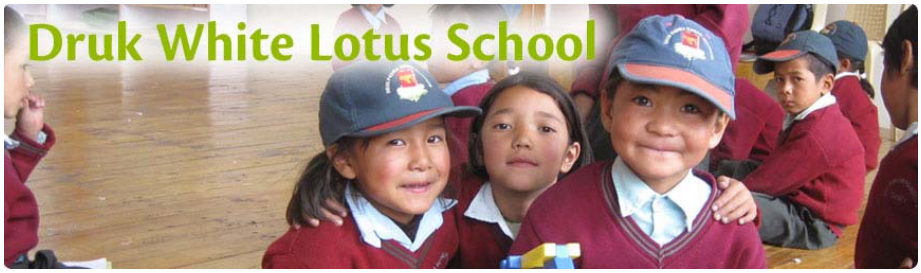
LANDSCAPE STRATEGY

a strategy to support environmental education, conservation and biological heritage.



Druk White Lotus School has been created over the past twenty years by local people, with the support of Drukpa Trust (a UK charity) and Live to Love (a global humanitarian organisation). The school serves more than 700 students from nearby villages, nomad groups and remote areas. The school stands on a wind-swept barren desert in the Indian Himalayas, at an altitude of 3,500m.

The campus was hit by an exceptional mudslide in 2010. Fortunately nobody was killed or seriously injured at the school, and the buildings withstood the onslaught, but many external spaces were left covered in up to a meter of mud, boulders and debris. This document sets out how and why we wish to transform some of the devastated spaces into gardens for the children - for environmental education and to help conservation of Ladakh's cultural and biological heritage.

Charitable purposes: environment, education, wildlife, conservation, biodiversity, sustainability, arts, heritage, youth enterprise.

Contents

Ladakh – sometimes known as 'Little Tibet' – is an ancient former kingdom in northwest India, bordering Pakistan and the People's Republic of China. Ladakh has two administrative Districts: Leh (majority Buddhist) and Kargil (predominantly Muslim).

The Leh Valley lies at an altitude of about 3,500m and the surrounding mountains rise to over 6,000m. The area is remote: the main road linking the region with the rest of India is cut off by snow for about 6 months each year. Temperatures range from -30°C in winter to 30°C or more in summer.

This is a high-altitude 'cold desert' environment where water is precious. Annual rainfall averages only 102mm. Agriculture and human settlements depend on snowmelt water that flows towards the Indus River. When melt water is available from streams, the near-constant sunshine creates excellent growing conditions.

Strong winds and dust storms can hinder plant growth, but walls, fences and shelterbelts can improve the microclimate and create a virtuous circle for plant establishment.

Traditionally, most Ladakhis were subsistence farmers growing mainly barley and vegetables or were nomads tending goats and yaks, while some supported trade linked to the Silk Route until borders closed. The opening of a road in the 1960s linking Ladakh with the plains brought large numbers of army personnel and enabled the spread of the Indian civil administration. Ladakh was opened to tourism in 1974 and today over half of Ladakh's income comes from the tourist industry.

Environmental and Social Challenges

Knowledge and skills gap. Government schools are located across Ladakh. However, the system still relies heavily on rote learning rather than stimulating thinking and understanding. For various reasons, around a quarter of Ladakhi students fail the end-of-school matriculation exams. For those who do pass at age 16+, poor teaching and inappropriate careers advice lead many students to study subjects that are only weakly linked to livelihood and thereby aggravate youth unemployment, create frustration and risk social unrest. Science, technology, engineering and mathematics are weak in Ladakh, and the analytical skills required to address problems such as climate change, water supply, pollution, urbanisation and youth unemployment need strengthening.

Cultural erosion. Ladakh is one of the last remaining places where indigenous Tibetan Buddhist culture and spiritual traditions survive in a free society. That culture is under threat from many directions. Television brings Hindi movies, plus Japanese and American cartoons. Indian and international tourists come to visit and flaunt their material wealth. Meanwhile, many heritage buildings and artefacts are decaying due to lack of resources.

The changes are bringing about changes in lifestyles, notably in the case of nomads and subsistence rural villages.

Uncontrolled urbanisation. Many nomads from the Tibetan plateau have sold their animals and moved to town; more are likely to follow. Nomads can end up in precarious situations as unskilled labourers seeking day-work. Many young people from rural villages are turning their backs on the land and the ways of their parents in order to seek what they see as a better life as trekking guides or taxi drivers based in town.

The resulting urbanisation is unplanned and lacks basic infrastructure. Old irrigation channels are being abandoned and new building is often on agricultural land.

Water. Weather patterns are changing, possibly related to climate change. Glaciers are receding. Extreme events are occurring, such as cloudbursts and mudslides in 2010. Some villages have been forced to move when adjacent permafrost ice melted and disappeared. See the movie *'Jungwa - the Broken Balance'* by Stanzin Gya for

a Ladakhi view of what is happening.

Water supply in the main town of Leh is vulnerable. There is no mains sewerage system and water-courses are becoming polluted.

The Response

In 1992, groups of nomads and villagers requested help from their spiritual leader, His Holiness Gyalwang Drukpa, to educate their children. The idea of Druk White Lotus School in Shey was relaunched, having been present in the mind of His Eminence Thuksey Rinpoche in the 1980s.

Villagers in Shey donated land and a charity was created in the United Kingdom in 1992 *(Drukpa Trust)* to help deliver and support the school. Drukpa Trust continues to support this endeavor, alongside Live to Love, His Holiness' global humanitarian organisation.

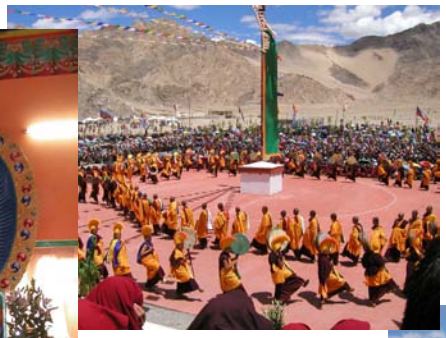
His Holiness the Dalai Lama, patron of Drukpa Trust

"I am happy to learn that the Drukpa Kargyud Trust plans to build a new school in Ladakh that will provide a practical modern education combined with an education based in traditional Ladakhi culture. The school also intends to be non-sectarian and will be run on ecological principles. The idea of having a modern school which lays equal emphasis on the importance of preserving the valuable aspects of a traditional culture is very encouraging. I feel that Ladakh, sometimes known as 'Little Tibet', provides an ideal location to develop this idea. I have always believed in giving equal importance to both modern, scientific knowledge and traditional Buddhist culture. A proper synthesis of the two, with good motivation, can give rise to a positive result."

Druk White Lotus School sits on 11.5 hectares of high-altitude desert land, just outside the irrigated area of the River Indus, which flows nearby on its 3,200km journey from the Tibetan Plateau to the Arabian Sea.

Today, more than 700 children attend the school and two batches of students have matriculated so far. Around half of all students come from remote valleys or nomad groups, and live on the campus during term time.

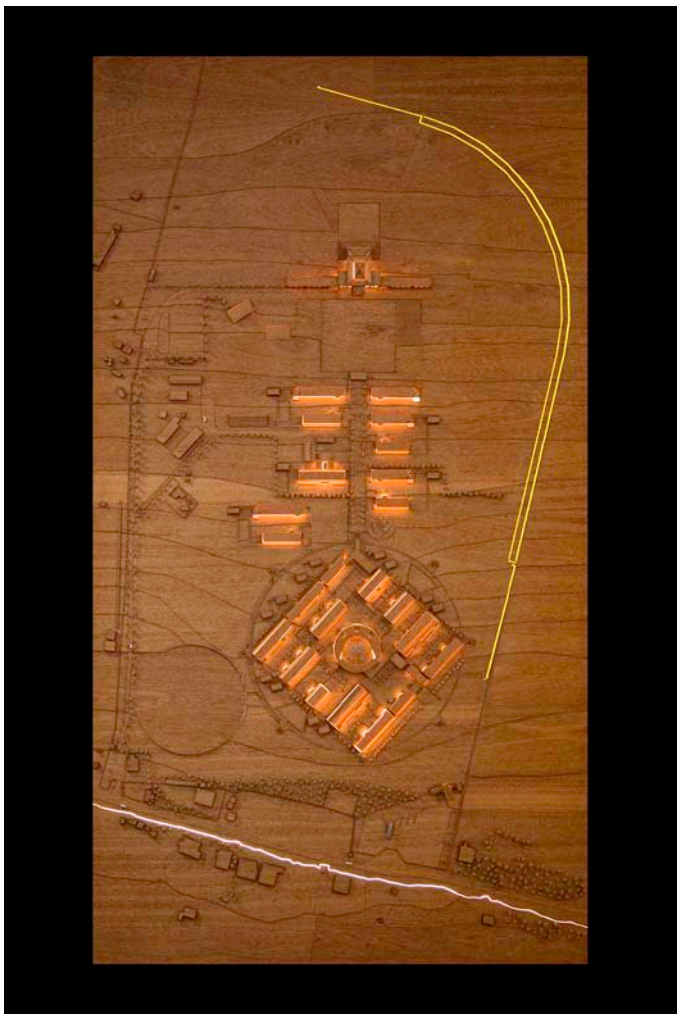
The Shey campus is becoming a notable centre for Ladakhi culture. In 2003, His Holiness decided to conduct the Ornaments of Naropa ceremony on the campus and Naropa Photang was built to host the event and welcome around 50,000 people. Today, around 70 nuns care for the Photang and its surroundings. Their presence and spiritual practice bring a special atmosphere to the campus. It is likely that the millennial anniversary of Naropa (a great sage from whom the Drukpa Lineage is descended) will be celebrated in Ladakh in 2016 and His Holiness will again (on a 12-year cycle) display the Ornaments of Naropa. Within the school, emphasis is placed on teaching the Bothi (Ladakhi) language and performing Ladakhi songs and dances.



Architectural Masterplan

A masterplan was conceived by His Holiness and planned with the help of two young architects in the mid-1990s. Subsequently, architects and engineers from Arup Associates, an international consultancy, provided professional services on a pro bono basis and the Arup Design Team continues to this day.

His Holiness Gyalwang Drukpa laid out the basic plan of the teaching area based on a 9-square mandala. The concept of the mandala is explained below. The residences, dining hall and other facilities are located along a north-south Spine, and form a pattern of a key: symbolic of the 'key to enlightenment'.



The landscape should complement the award-winning buildings, and vice versa. The form of the Architectural Master Plan and the Landscape and Gardens Strategy must be consistent, and buildings and landscape works should use the same or complementary materials.

The school buildings make extensive use of solar energy and have won numerous international awards for sustainability, including: three World Architecture Awards (2002), Design for Asia Grand Award (2009), the Emirates Glass LEAF Award for 'Best Sustainable Development' (2012), the 'Test of Time: Environmental' Award from the British Council for School Environments (2012), and the International Award for Architecture in Stone, presented in Verona, Italy, in 2013.

One night in August 2010, exceptional cloudbursts triggered colossal mudslides in parts of the valley. A mudslide flowed over the school campus and swept away books, furniture and equipment, but left the occupants alive and the buildings standing. The areas around the buildings were covered in mud, boulders and debris to a height of up to a metre. Since 2010, we have built a defence wall 1km long and 3m high along the eastern and northern campus boundary to protect the school and its occupants in the event that mother nature vents her fury again.

Drukpa Trust and its local partners resolved to transform this scene of devastation into a lush and stimulating learning environment for students, staff, parents and visitors.

For further information about the planning, design and sustainability credentials of the school please see "Building Culture", a book produced by the University of Buffalo at New York in 2006 on the occasion of a visit by His Holiness the Dalai Lama.

Landscape Objectives

Ladakh has a high-altitude environment with extreme temperatures, intense radiation, strong winds, low precipitation and low humidity. These conditions created an extensive barren landscape with steep and vertical glaciated slopes, minimal forest cover and sporadic high-altitude pastures.

The flora is classified as alpine and differs significantly from the rest of the Himalayas. The typical species are annual and perennial herbs, low shrubs and bushes. Many are listed as Rare, Endangered and Threatened (RET) species. The region is rich in medicinal flora and has considerable endemic diversity. Native plant species are used in the local Amchi system of medicine, as well as in Tibetan and Ayurvedic medicine. Knowledge of Ladakh's fauna and flora is important for medicinal, biodiversity and economic reasons.

The school landscape should complement the award-winning buildings, use similar locally-sourced materials and be of high quality. The campus will become:

- an outdoor learning facility for students and staff at Druk White Lotus School, including a resource for conservation and biodiversity;
- a Ladakhi garden based on best green practice that will inspire and 'teach' all those who enter; and
- a place for students, staff, parents and visitors to connect with nature, and learn about big environmental issues such as climate change, sustainability and biodiversity.

An outdoor place of learning

The school follows the curriculum set by the Jammu & Kashmir State Board of School Education and students sit its matriculation exams. Parents are keen for their children to matriculate with formal qualifications, because this is seen as a ticket to a secure government job (although in practice the number of available government jobs is now very limited). Of course education is much more than that - rote learning does not produce rounded human beings who can *think* and *understand*.

Many students are first generation learners, meaning that their parents received little formal education. Many come from remote agricultural communities or nomadic groups that tend animals. Formal studying from books does little to retain traditional knowledge and skills about the land, plants, animals and the weather.

The gardens will be spaces where children can learn by doing, get their hands dirty, experience the joy of seeing seedlings poke through the ground, and eat their own produce ... a place where young people can connect with nature and understand their ancestral roots. Exploration and learning in this big outdoor classroom will complement learning in the indoor classrooms in formal lessons.

> "Nature provides a wonderful way to balance out all the technology in our lives."
> His Holiness Gyalwang Drukpa

The school environment will be a unique teaching and learning resource. This approach has been fostered by the *Learning Through Landscapes Trust* in the UK, and its principles and techniques could be adapted to local conditions. The Druk White Lotus campus can become a teaching resource, a research resource, a preparation for careers in landscape management, eco-tourism and cultural tourism - and an exemplary project for the Himalayan region.

Gardens that inspire

The school is located in a predominantly Buddhist community. A strong connection exists between Buddhism and gardens: the Lord Buddha was born in a garden in about 2,500 B.C.E., spent much of His life teaching in the open air and in gardens, and passed away in a garden. The campus buildings embody Buddhist philosophy in the form of a mandala, and the gardens will draw on local traditions and aim to inspire all those who enter.

This special space will contain a plant nursery, shelterbelts, woodlands, orchards, demonstration habitats, sports facilities, and themed gardens such as a healing garden.

The landscape project is being developed on a professional basis with the help of teaching staff and postgraduate students from the School of Architecture, Design & Construction of the University of Greenwich, London.

We hope to attract tourists to the on-campus Visitor Centre, inspire and inform them and, with their participation, generate income towards school running costs.

Climate change, sustainability & biodiversity

Ladakh is experiencing sharp variations in weather patterns. On 5th August 2010, exceptional cloudbursts led to colossal mudslides in the Leh Valley that killed around 250 people. In winter 2012-13, extreme snow and cold led to the loss of around 40,000 animals in the Changthang region, where nomads live and many of the school's students come from.

In June 2013, the World Bank published a report called: *"Turn Down the Heat. Climate Extremes, Regional Impacts, and the Case for Resilience"*. The report states:

> "*If the world warms by 2°C – warming which may be reached in 20-30 years – that will cause widespread food shortages, unprecedented heat waves, and more intense cyclones.*"

High temperature extremes are likely to affect crop yields and nutritional values, and put food resources at severe risk. Forage for livestock is likely to be affected and cause problems for nomads. The report continues:

> "*Irrespective of future emission paths, in the next twenty years a several-fold increase in the frequency of unusually hot and extreme summer months is projected.*"

Northwest India is susceptible to the risk of spring flooding in low snow years and drought during the summer agricultural season. The report says that the Indus is "*highly susceptible*" to climate change-induced glacier melt and reductions in snowfall run- off.

It is therefore important that students, parents, visitors and tourists *understand* the basics of climate change, and how they may need to change their behaviour and adapt.

We will seek to promote awareness of the issue via the on-campus Visitor Centre and encourage young people to become aware, study the science, and possibly continue on to higher education to acquire knowledge and skills that can help Ladakhi horticulture and society adapt to changing conditions.

As weather becomes more variable and as temperatures rise, much research and adaptation will be required to find the optimal heat- and drought-resistant crops for Ladakh. Ladakh may not be able to depend indefinitely on grain imported from elsewhere in India.

It is important that young Ladakhis are aware of the risks ahead, and are equipped with the thinking and analytical skills to help themselves, their families and their society.

The Buddha became enlightened around 2,500 years ago in Bodhgaya; film hero Rancho communicated a strong

social message through the medium of the *'3 Idiots'* Bollywood movie; and the Druk White Lotus gardens aim in a modest way to inspire students, staff, parents and visitors, enabling them to learn something about themselves and their world, and help them along their life path.

Landscape Concept

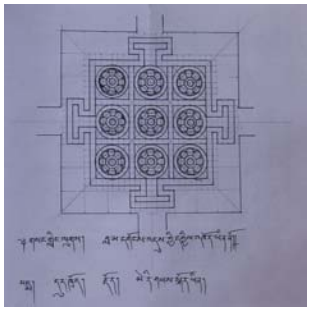
His Holiness and His architects planned the layout of the main school buildings as a Mandala. A Mandala is a pattern used in teaching and meditation. According to a leading scholar:

> *'The mandala is, above all, a map of the cosmos. It is the whole universe in its essential plan, in its process of emanation and of reabsorption'*.

Mandalas explain man's relationship with nature: we are born into a world of impermanence and suffering. But we can escape from suffering through good actions and earning merit. Buddhists understand life as a path from samsara to nirvana: from suffering to enlightenment. Applying the forms and symbolism that inspired the buildings produces three landscape zones:

Mandala. The architects' Mandala plan comprises nine squares, has a circular courtyard at its centre, and an outer ring known as a 'Cora' route. Eight of the nine squares house the Nursery & Infant, Junior, Science & Art, Junior and Secondary classrooms, plus administration buildings. An outer Cora circle represents the boundary between the everyday physical world and the inner world of enlightenment. The Cora route could also double as an exercise trail for students.

Tourists have entry to the Mandala in guided parties only and at times which do not inconvenience the school community. The courtyards are becoming peaceful places for outdoor study.



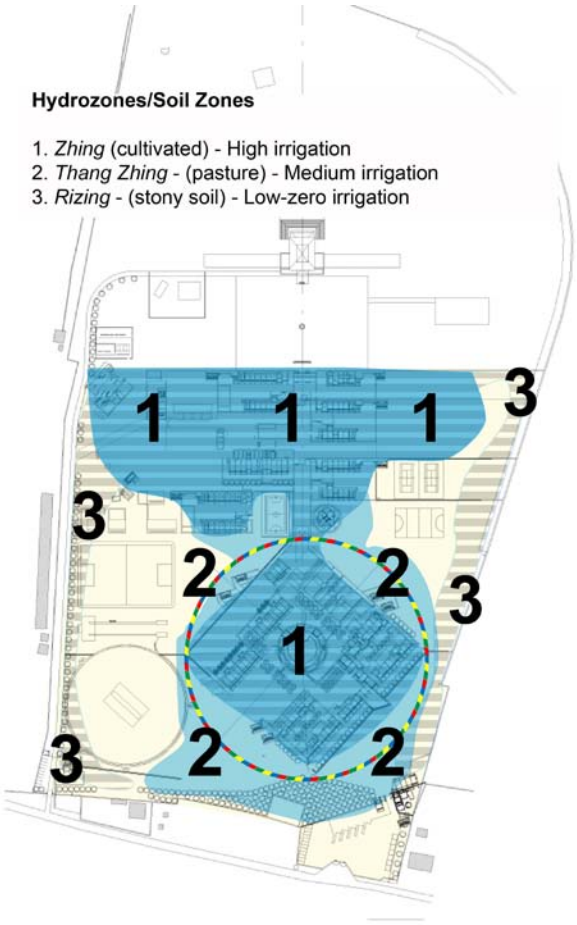
The mandala is an important element in Buddhist and Ladkahi culture.

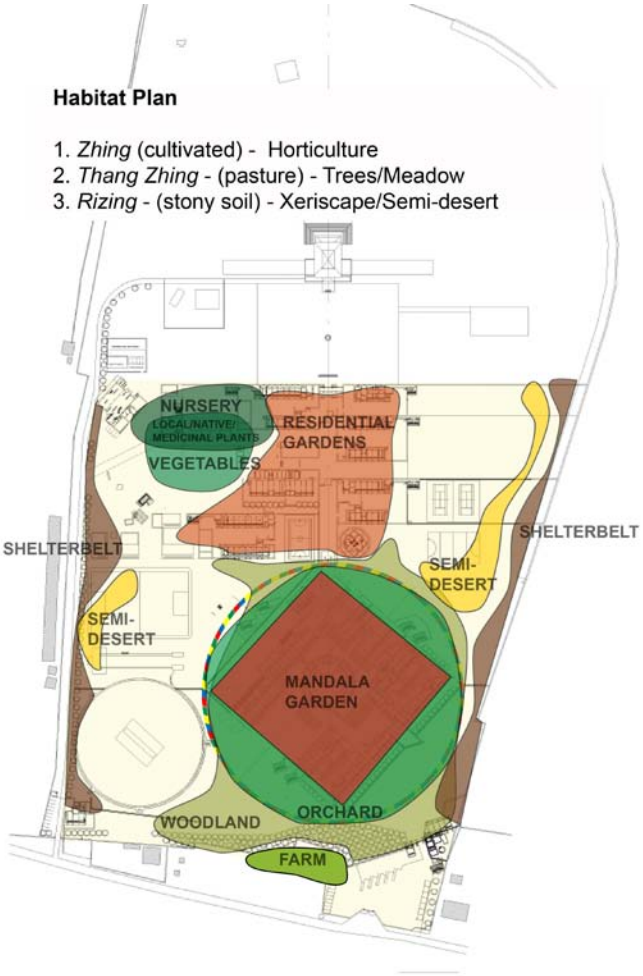
Dragon Garden. We are naming the land between the Mandala and the school boundary a '*Dragon Garden'*. Dragons are symbols of love and gentle power. They protect the people of Ladakh. Spaces will be created for sports, play and growing food. Planting on irrigated land will reflect the man-made habitats of Ladakh (meadows, orchards, vegetable gardens and thickets), while planting on non-irrigated or lightly-irrigated land will reflect its native flora and thus contribute to biodiversity. Dragon shelterbelts on the east and west boundaries will offer protection from windblown dust, using rose and sea buckthorn.

Indus Landscape. The Indus Valley landscape is interpreted as a resource for learning about Ladakh's history and culture (Shey Palace is located nearby - Shey was an ancient capital of Ladakh). It is the valley of one of the

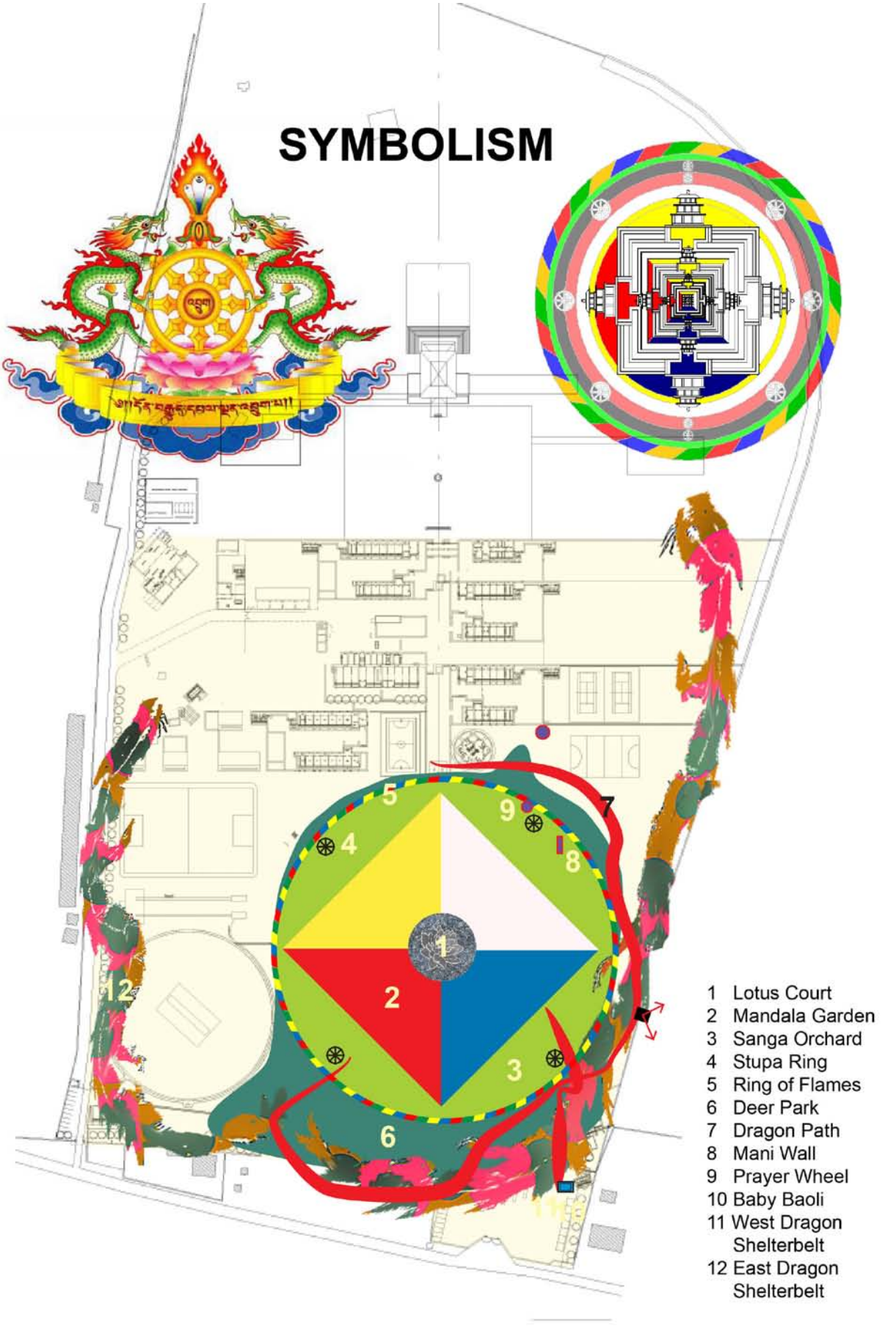
world's great rivers, the meeting point of the tectonic plates which created the Himalayas, the course of a feeder route to the Silk Road, the location of a significant group of Buddhist monasteries - and a great site for a school.

Since water is the driving factor, the campus is first split into hydrozones/soil zones. The zoning determines the type of habitat and the planting that is possible.



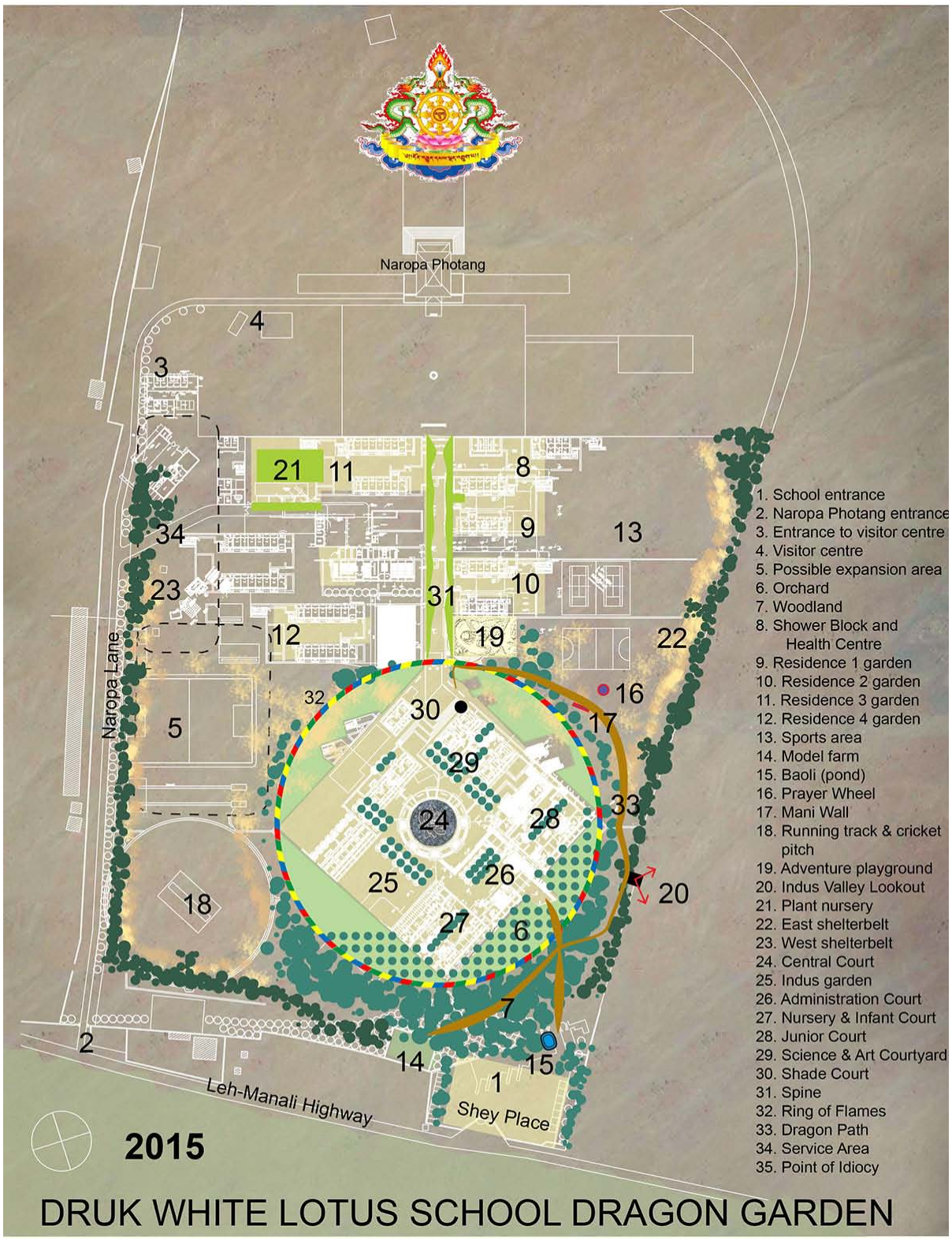


SYMBOLISM



1 Lotus Court
2 Mandala Garden
3 Sanga Orchard
4 Stupa Ring
5 Ring of Flames
6 Deer Park
7 Dragon Path
8 Mani Wall
9 Prayer Wheel
10 Baby Baoli
11 West Dragon Shelterbelt
12 East Dragon Shelterbelt

Marrying the architectural masterplan with the landscape strategy gives rise to the following:



Design Narrative about Forms and Symbols

The Drukpa Lineage of Tibetan Buddhism was founded 1,000 years ago in Tibet. Its symbol contains a Dharma Wheel, a Lotus Pond and two dragons.

The name of the school in the local language is 'Druk Padma Karpo', which translates literally into English as 'Dragon Lotus White'. The name derives from a great Buddhist scholar, Kyabje Padma Karpo, who lived in the C16th C.E. and whose statue may be found in Naropa Photang (a nunnery) at the top of the site.

The campus is becoming a significant centre of Ladakhi heritage. Naropa Photang houses a community of Drukpa nuns, whose practice brings a peaceful air to the campus and imbues it with spiritual characteristics. The Photang itself was decorated by top local painters and sculptors. The Chair of the School Managing Committee, His Eminence Thuksey Rinpoche (who is Ladakhi) is ensuring that by teaching the Bothi (Ladakhi) language and performing Ladakhi dances and rituals, the school is anchoring the children in their cultural roots.

The masterplan is founded on three important Buddhist forms: a Mandala, a Dharma Wheel and a Cora Route. As indicated above, the physical layout of the main teaching area is based on a 9-square mandala, and its associated colour pattern. The Mandala has a circular court at its centre. As the symbolic heart of the school, this court is used for school assemblies and other events, with the children sitting on the ground. The aim is to use local paving materials to represent a white lotus (Padma Karpo). A lotus represents the belief that humans are born into a world of suffering (as the lotus is rooted in mud) but, like the lotus, can by their own effort rise out of the mire and glisten in the sunny world of enlightenment.

The classroom buildings in the Mandala are encircled by a 'Cora' route. Devotees typically 'do cora' by circumambulating clockwise and reciting mantras. In our case, the Cora route will be a path for exercise and quiet contemplation. The plan is to demarcate the Cora route with a ring of granite boulders, painted in the traditional colours: blue, red, yellow, green and white. The rest of the campus, between the outer ring and the site boundary will be used for residential buildings, plants, play areas, sports grounds and other infrastructure.

Landscape, Garden and Sports Elements

School Orchard. In past times, all Ladakh's fruit was grown in local orchards. Today, fruit is often flown or trucked from other parts of India. In part, the change took place because traditional irrigation is labour-intensive. The school has installed a modern drip irrigation system with a water use efficiency of 80-90%, which compares well with the 20% efficiency of flood irrigation and is much less labour-intensive. Local fruits are sweet, piquant and nutritious. We would like the school to be a demonstration project and help establish a basis for future business opportunities.

School Woodland. Almost all the trees in Ladakh are cultivated and we wish to continue the traditionally close

integration of tree planting with buildings. The plan is therefore to establish a school woodland in the south-east corner of the site with a meadow ground-cover. When the trees have grown, the children will experience a traditional Ladakhi environment on their walk from the road to the classrooms, instead of walking across an unmarked sandy desert.

Residence Gardens. The design aim is to make extensive use of local and native plants in small gardens near the children's residences. With many of the children coming from remote parts of Ladakh, use of these plants will demonstrate their importance in a modern society and provide some of the emotional comfort that comes from familiar plants. At present, the residences are surrounded by a sea of sand. The only relief comes from planters outside the dormitory windows. *Alcea* (hollyhocks) and cosmos grow in these beds. We would like to have more extensive planting and much greater species diversity.

Teaching and Learning Gardens. The classroom courtyards are surfaced with compacted sand and gravel, and have some trees and narrow planting beds outside the classroom windows. The most developed courtyards are used for quiet study by infants, juniors and seniors. Students sit and read beneath the trees and day-pupils eat their lunch, enjoying the sunlight and fresh air. Other courtyards are bare sand, with glare and dust. Our plan is to treat manage all the courtyards as gardens for outdoor use and study.

Theme Gardens. Ladakh has a rich heritage of medicinal plants and long experience with its own Amchi tradition. A healing garden will showcase local medicinal plants, while music and science gardens will encourage students to learn through play in these spaces.

Shady Court. His Holiness Gyalwang Drukpa sees the school plan as a key, where the key pattern is formed by the Mandala, the Spine path and the children's residences. The meeting point of the 'blade' and the 'handle' is a site for a contemplative courtyard. This 'key' can be seen as a 'key to enlightenment'. Our aim is to create a sitting and meeting place with heavy shade trees. In hot bright weather it will be a place of visual solace.

Playgrounds. Some of the playgrounds were swept away in the 2010 mudslide. We have created a new adventure playground at the southeast end of the Spine, and plan to replace the Nursery & Infant playground as soon as possible, equipped with swings and slides.

Sports and Games Areas. The school management is keen that the children be fit and healthy. Almost all their ancestors worked in the fields and there is a concern that moving to a modern society is bringing modern health problems.

The school plays a lead role by hosting an annual 'sports meet' among 14 local schools. Land is available for pitches and games areas, but the school is located in a stony desert and swept by strong winds and dust storms. The land needs to be leveled, cleared of boulders, given a hardcore foundation in some locations, and protected by shelter belts. The facilities we plan to complete or make are:

- A full-size cricket pitch (cricket is an obsession), with practice areas and nets
- A 200/400m athletics track and field sports area
- Two soccer pitches
- A Multi Use Games Area (MUGA) for volleyball, badminton, netball and tennis
- A basketball court.

Model Farm. Except for air-freight, Ladakh is cut off from the outside world for half the year because the high passes, from which the region takes its name, are blocked by snow. This fact provides strong support for the

global case for nourishing sustainable local food resources. We therefore wish to develop a school farm. It will be on the south boundary of the site, adjoining the farmland in the Indus Valley and will be a link for the children between their past and their future.

Solar array and pump. Since the school opened in 2001, its water supply has come entirely from solar-powered pumps. Water levels in the tube wells have been monitored and are stable. If the full landscape plan is implemented, the school will need of an additional well and additional solar power to supply water for the school gardens.

Prayer Flags. Multi-coloured prayer flags are printed with mantras and are hung at high points and other auspicious locations. The wind blows the flags and disperses the aspirations and good wishes to all sentient beings.

Dragons. The name Druk means 'Dragon' - a symbol of compassion. They can billow through the site, as 'clouds' of vegetation, to provide shade, keep down the dust and protect the school community. The Dragon thunders in the sky with the sound of compassion that awakens us from delusion and increases what we can know through hearing. Dragons have the power of complete communication. Just as we do not see sound, we do not see dragons - at least not usually.

The greening of the campus is associated with four dragons: a Dragon of the Mountains - who stores water in its snowfields; a Dragon of the Rivers – who transports water via an underground aquifer to the campus; a Dragon of the Deserts - who provides the sand and silt to make fertile soil; and a Green Dragon who is providing plants.

Part of the reason for the dragon narrative is to involve the school community in the project, and to attract and interest visitors. This aim is furthered by holding an annual garden competition with prizes handed out by the volunteer landscape architects.

This was the inspiration for making a Dragon Garden. We plan to have three types of recognizable dragons:

- *Dragon Paths* defined by low walls built in local granite and shaped by local masons;
- two *Dragon Shelterbelts* to protect the school boundaries, reflecting the two dragons which enclose the Drukpa Emblem; and
- *Wall Dragons*, painted on rendered and white-painted mud brick walls by the school children under the guidance of their art teacher.

Implementing the Vision

School construction

Completion of the secondary school is scheduled for the end of 2015. The school will then have essential physical facilities to provide education of 740 children from age 4 through to age 16+. The landscape work will be conducted in parallel, and development work will continue through 2016 in order to 'green' and hardscape areas and complement buildings in accordance with the strategy set out above.

Landscape Team

We are seeking to create a special landscape environment in a society in which the intellectual concept of 'designed landscape' does not (yet) exist, and where there are no nurseries to go and buy plants.

People are the key resource in making progress. Drukpa Trust and the University of Greenwich are supporting the creation and development of a local team comprising: a Landscape Manager, a Gardener and assistant gardeners. The Gardener and one assistant are in place, and the intention is to recruit a Landscape Manager as soon as possible in 2014, subject to funding. They will work under the direction of the Facilities Manager, who is also responsible for the operation and maintenance of school buildings and infrastructure.

The local team is supported by postgraduate volunteers from the University of Greenwich. The pattern is for one volunteer to go on site for about 3 months from the start of the season in March (auspicious tree planting time), and to hand over to a second volunteer in June/July to take things through until September, when temperatures drop and the season winds down.

The key human resource should in time become the students. On the occasions when they have been able to participate in workshops and annual garden competitions, many have been extremely keen. However, much more needs to be done, led by the Landscape Manager, to free them to be involved. Future participation could be in formal lessons, by integrating practical and theoretical work in geography, science and art, for example, using indoor and outdoor classrooms. Additionally, an after-school Garden Club for residential and Shey children could release abundant interest and energy, and help them take ownership of what is being created by the community.

Water management

The school is built on desert land - since Ladakh has very little farmland, this was a wise decision. Ladakh has an area of 86,904 km^2 (roughly the size of Scotland or West Bengal), but only 160 km^2 can be cultivated (comparable to only about one-tenth the area of Delhi).

Gardens require water. The school's supply is raised from boreholes by solar-powered pumps. Ladakh's hydrological resources have not been fully investigated and we are working on the professional judgment that the aquifer is dynamically re-charged from snowmelt. The water level has remained stable since pumping began and we believe that its use on the campus will act as a 'sponge', delaying the passage of water from the mountains to the Indus River at the low point in the valley.

Traditional Ladakhi agriculture depends on flood irrigation. Channels conduct melt water to small fields and orchards that are flooded periodically according to local water rights. Though the system is effective, well-understood and beautiful, it has several disadvantages:

- at Shey, the only available stream runs from Stagmo and has water for no more than 5-25 days/year;
- the irrigation canal south of the Leh-Manali highway is dedicated to agricultural use and pumping the water from here would be inefficient in terms of energy;
- distributing water within fields by flood irrigation is labour-intensive;
- the efficiency of water use for channel and flood irrigation is about 20%, compared to about 80% for a drip irrigation system.

Hose pipe water was used to establish plants near the school buildings, but the site is too large to be irrigated in this way. A decision was therefore taken to invest in a drip-irrigation system to supply the gardens and exemplify a sustainable approach to landscape development in Ladakh.

In order to use water as economically as possible, it will be used in three types of hydrozone (Figure X):

- High-intensity irrigation (Zone 1 in Figure X): the Nursery and Spine, plus planting beds in the Mandala Garden;
- Medium-intensity irrigation (Zone 2): orchard and woodland areas around the Mandala Garden; and

- Low-intensity irrigation (Zone 3): shelter-belt planting to protect the site from wind and dust, which will not require irrigation once it has been established.

Soil strategy

The school is built on an outwash fan that extends from the mouth of the Stagmo Valley to the agricultural land bordering the River Indus. Cultivable land in Ladakh is called *Zhing*; rich land (e.g. for vegetables) is called *Zhing-zang;* and meadow land is called *Thang-zhing*. The Druk White Lotus School is built on stony land, described as *Ri-zhing*. It is a coarse skeletal substrate:

- predominantly sharp sand, but with a range of particle sizes, including silt, fine sand, gravel, stones and boulders,
- minimal soil development,
- low chemical weathering,
- very little humus,
- a sparse microfauna,
- very sparse vegetation,
- an alkaline reaction (pH 7.2 – 8.0) because of calcification by rainwater-borne CO_2.

The traditional Ladakhi method of converting *Ri-Zhing* to agricultural land is by leveling it, removing the stones and flooding it with muddy stream water. Since this type of water is not available, it will be necessary to: (1) get as good a range of particle sizes as possible, including sand, silt and clay, (2) improve the availability of nutrients: nitrogen, phosphorous, potassium and trace elements, (3) build up the humus content using animal manure, kitchen waste, composted toilet waste etc.. Organic material is viewed as treasure and will be composted, with the composting facility protected against desiccation, vermin and dogs.

Vegetation strategy

Vegetation cover is a key objective of the landscape strategy, partly to create a pleasant environment but also to grow food and create an education resource for the school. With water, soil and shelter, there is every likelihood that lush vegetation can be established. The school's protective wall will then enclose:

- a collection of native and local plants and other flowering plants, mostly in the Mandala Garden;
- demonstrations of Ladakh's horticultural and agricultural land use types (orchards, meadows, vegetable plots, fields);
- dioramas of Ladakh's natural habitats (classified as alpine, oasitic and arid); and
- Ladakhi woodland and shelterbelt species.

With regard to the use of native and exotic species, the principle will be that when native plants are available to fill an intended role in the planting design, they will be given priority, but when native plants are not available, consideration should be given to using exotic plants (i.e. plants that are not native to the local area).

Planting on the campus will be planned to enhance biodiversity, with special consideration for creating ornithological habitats. Birds serve as marker and indicator species for habitat types.

Dr Reeve Heber, who lived in Leh from 1912-1925, described many of the qualities we would like to have in the Mandala and Dragon Gardens:

"Wherever a green village snuggles into the brown-red hillside, a rippling stream is heard and a cooling breeze felt in the little plantations of trees, whilst the soft evening light makes the green corn look like plush, or contrasts its autumn gold with the yellow glory of the poplars all set against a background of white snow peaks and blue sky...
Was there ever a more striking example of the desert blossoming as a rose than is seen .... in June and July [when] the bushes are aflame with red and pink glory of wild rose, sometimes single as our English rose, sometimes double and varying from light pink to the deepest crimson...
Nestling in the crevices between the hard bare rocks and stones of the same march, the beautiful fragile-looking columbine rears its dainty white bells, and the among the driest patches of stone... near it a bubbling brook runs down to join the river, and scattered about in its course are beautiful bushes of tamarisk, waving their prolific feathery blossoms in the breeze in a setting of green fields with scattered poplars, and framed like most Ladaki pictures, by the softly-graded lights and shades of the near hills, between and behind which peep the greater white peaks lined against the deep blue of a cloudless sky.
In the summer-time the village walls, formed loosely of stones set together with mud, give a foothold to all sorts of little feathery plants, one resembling a wild maidenhair with wee brown flowers.... the walls are often overgrown with a wild clematis which has the quaintest little brown flowers, surely turning into little elves and gnomes and when no human is at hand.
The edges of the fields and watercourses are adorned with yellow members of the ranunculacaea, vetches, purple representatives of the scrophulariacea, species of milkwort, wild parsley and mint, and even dandelions."

Money

After people, money is the most important resource needed. Investment funds are urgently needed in four areas:

1. To fund the local **Landscape Team**. The Landscape Manager is expected to cost £1,800 equivalent per year, plus £1,500 in his/her first year for training in the UK i.e. £3,300 in total. One of our volunteer landscape volunteers has already raised £800 for this purpose, and we have a £1,000 grant from a trust, thus leaving a funding gap of **£1,500**. The other local team members will cost **£2,000** in Year 1. Thereafter, staff costs of the local team are expected to amount to approximately **£4,000 per year** (Rs 4 lakh / US$6,400). This will be a recurring annual cost.

2. To fund the travel and subsistence expenses of the postgraduate **volunteers from the University of Greenwich**. Volunteers donate their time for 3-4 months, but the cost to Drukpa Trust is approximately £2,000 per 3-month stint for air fares, insurance and local subsistence. Ideally, two volunteers travel to Ladakh each year: one from March to June/July and the second from July-September i.e. the total cost is around **£4,000** (Rs 4 lakh / US6,400) per year.

'I envisaged the Shey School Project in Ladakh with the aim of providing a comprehensive modern education combined with the traditional cultures and value systems to the new generation of Ladakhi children. Such an educational programme would help the young Ladakhis face the world without losing track of their cultural and spiritual traditions. Any help, material or otherwise, towards this end will be welcome and highly appreciated.'

His Holiness Gyalwang Drukpa

3. **Development works**: Our target budget for development work to deliver the landscape plan is **£45,000** over the next three years (Rs 45 lakh / US$72,000) i.e. £15,000 per year, to include the direct cost of works, possibly some design work over the winter period, and fundraising and project management costs.

4. **On-going maintenance and upgrading**: The cost of on-going running costs will be quite modest (e.g. for tools, spares, plant replacement), and is estimated at **£3,000** (Rs3 lakh / US$4,800) per year.

In summary, funding needs for the landscape and garden works are as follows:

Local Landscape Team	Year 1: £3,500 (Rs 3.5 lakh / US$5,600) Year 2: £4,000 (Rs 4 lakh / US$6,400)
Postgraduate volunteers from the University of Greenwich	£4,000 per year (Rs 4 lakh / US$6,400)
Development Works	£15,000 per year (Rs 15 lakh / US$24,000)
On-going maintenance and upgrading	£3,000 per year (Rs 3 lakh / US$4,800)

Future-proofing

Druk White Lotus School aims to:

> *"give young people from this remote region the confidence and competence to succeed in the modern world, together with a sound grounding in Ladakhi language, culture and traditions."*

The best way to future-proof the lives of Druk White Lotus students, and of Ladakh, is through education: education in appropriate academic disciplines, education about local issues such as water supply and use, education about Ladakh's cultural and biological heritage, and education about global issues such as climate change.

Academic education will take place largely, although not exclusively, in the formal classroom environment, but we see traditional skills and livelihood skills being communicated, developed and nurtured in the 'outdoor classrooms' of the Mandala and Dragon Gardens.

It is very important that residential children can relate to their families and traditional activities when they return home in the holidays and retain contacts with their roots. And we want to alert students to livelihood opportunities available to them in modern horticulture, for example based around cultivating high-value, marketable crops using greenhouses and drip irrigation. Even if the opportunities are 'seen', training will be needed in due course to strengthen entrepreneurial attitudes, values and skills, and provide support in moving towards self-employment or setting up a small business.

An ultimate test of whether the Landscape and Gardens Strategy has been effective will be whether the students and staff 'take ownership' of what is being created by paid staff and volunteer experts, and they care for the trees and plants, water them, love them and learn from them.

Dissemination of landscape, garden and horticultural information, and relevant global issues, will take place inside the school, via the on-campus Visitor Centre and with the help of the University of Greenwich's network.

Educating young people takes years of sensitive, careful nurturing and needs resources: people, expertise, money and love. Druk White Lotus is a non-profit, fee-paying school that receives no direct financial support from the government and welcomes your support.

Annex A: Planting Strategy

Mandala planting

The Mandala is central to the school's operations, to the plan of the school, and to the symbolism on which the plan is founded. Varjrayana mandalas, like Tibetan art, are brightly coloured. The most appropriate way of colouring the Mandala Garden is with flowers using, in order of priority:

- native flowering plants
- local flowering plants
- other flowering plants

Orchard planting

The main cultivated orchard species in Ladakh are Apricot, Mulberry, Walnut and Apple

Meadow planting

Medicago sativa Alfalfa *Geranium*, *Potentilla*, *Geum*, *Campanula*, *Codonopsis*,

Woodland planting

Salix, *Populus*, *Junipurus*, *Betulus*,

Climbers

Clematis tangutica Clematis ladakhiana

Shelterbelt planting

Rosa webbiana Rosa macrophylla Rosa serica - white *Rosa foetida var. persiana* (yellow) *Myricaria elegans* False tamarisk *Caragana versicolor* or *arborescens* Siberian Peashrub *Artemisia macrocephala*

Biome planting

- Alpine planting
- Semi-desert planting
- Woodland 'The only wild trees growing widely throughout the area are species of Willow *Salix*, (Ladakhi: lchan-ma) and Juniper *Juniperus* (Lad: shugpa). Poplars *Populus* (Lad: yerpa) and Birch *Betula* utilis (Lad: stakpa) occur in a few places.'

Medicinal plants

Ladakh's Amchi system uses many medicinal plants which grow in gardens e.g.
Achillea millefolium, Yarrow/Tansy *Aconitum heterophyllum*, *Geranium pratense*, Meadow cranesbill *Origanum vulgare*, Origanum *Ranunculus trichophyllus*, Water Crowfoot *Polygonatum verticilltum*, Solomon's seal.