

Special

Hearst Lecture: Planning for Bhutan

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Every quarter, the College of Architecture and Environmental Design's Hearst Lecture Series, endowed by a generous grant from the Hearst Foundation, brings to campus an impressive array of both long established and younger professionals from the design disciplines. In the Spring of 2016, Christopher Benninger, one of India's most highly decorated architects, was invited to present on his 45-year plus international work experience in the fields of planning, urban design, and architecture. At the occasion, he also launched his latest book "Architecture for Modern India", an impressive collection of his plans and projects.

My life in India, as opposed to my travels through Asia, began in an antique land called Bharat in October 1971. I came to India to initiate the School of Planning, along with my friend and mentor Balkrishna Doshi who had founded the School of Architecture at Ahmedabad in 1962.

Our focus was on the rational deployment of scarce resources to achieve inclusiveness and equality in sustainable environments, while facilitating peoples' struggles to meet their basic needs. The physical planning of neighborhoods, villages, towns, cities and regions were seen by us as mere tools of larger social changes. Our focus was on human development! We expanded our vision from physical planning to social, economic and cultural realms, employing investments, incentives and regulations that could temper development for better or for worse.

We slowly began to call this "the new planning," as the old planning was restricted to preparing two dimensional maps. These old maps were to control development; the new planning was to facilitate and empower people's socio-economic transformation.

Our method was not an end product or a destination; that is, a plan! Our planning was a process of empowering and facilitat-



ing people to create more inclusive, more equitable and sustainable opportunity systems through vehicles called human settlements. These two types of planning (that is, two-dimensional physical planning and multi-dimensional human development planning) were not understood. In the popular use of the word, a "plan" is a noun, an object, and a document. In our concept, planning is a verb, a process, and a way of "thinking-doing."

My journey in this search began when Sir Robert Jackson presented me with a lifetime subscription for Ekistics journal in 1963; when John F. C. Turner accepted my plea to become my guide on a 1966 shelter project at Harvard; through Horacio Caminos at MIT under whom I worked on settlement processes; and thanks to my guru Josep Lluís Sert, the inventor of the urban design concept, who established the link between architecture and planning. In Greece, at the Athens Centre of Ekistics, Jaqueline Tyrwhitt the editor of Ekistics journal, Constantinos Doxiadis, Panayis Psomopoulos and my mentor the economist Barbara Ward instilled in me a sensitivity to the social dimensions of planning.

During many visits to Athens, and as their protégé at the Delos Symposium in the summer of 1967, I was sensitized to the holism of human settlements. In my subsequent visits to Athens, I lived in Jaqueline Tyrwhitt's house, "Sparozza," in Attica, designed by my teacher Jerzy Soltan. At the Athens Centre of Ekistics, I could listen to, talk to, argue with and learn from Buckminster Fuller, Arnold Toynbee and Margaret Mead. There were no lines drawn between physical, economic and social transformations. There were no lines drawn between teachers and students, seniors and juniors, or seasoned experts and emerging young professionals.

Note from the editor: Due to technical difficulties in recording Professor Christopher Benninger's lecture, with his approval, FOCUS decided to publish an excerpt from his book *Architecture for Modern India*. The illustrations, except where indicated, are also from the book. This excerpt reflects, in greater detail, part of his lecture at Cal Poly. Professor Benninger's work can be seen in more detail in his firm's website www.ccba.in

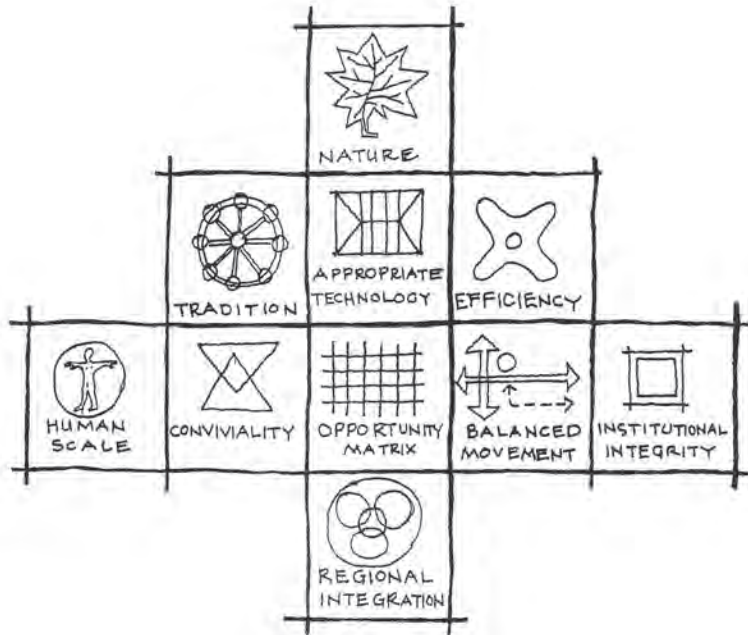
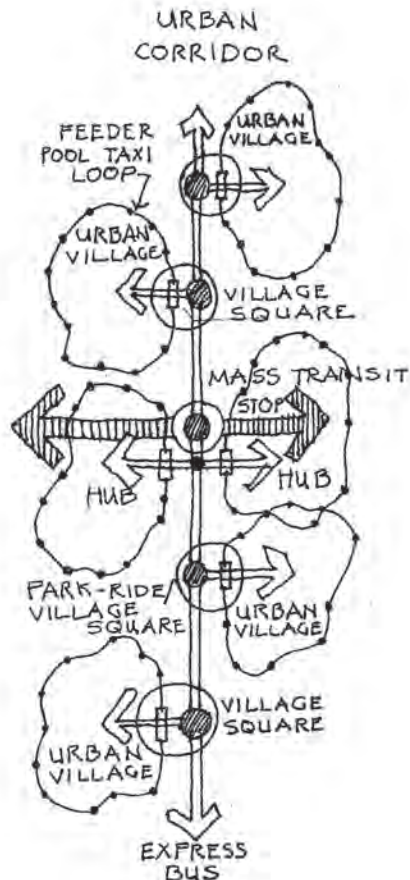


Figure 1: The Ten Principles of Intelligent Urbanism.

Figure 2: Balanced movement.



Principles of Intelligent Urbanism

This journey, my wonderful mentors, and my work in India, Sri Lanka and Bhutan led me to seek a “credo,” or a group of sacred axioms that would lay down a value based framework, within which participatory planning with stakeholders, experts and affected people can proceed. I call these axioms the Principles of Intelligent Urbanism, which were first published in *Ekistics* journal (2002), and soon after in Roger Caves’ pioneering *Encyclopedia of the City* (2005) (Figure 1). These short axioms are to be discussed, debated and amended by stakeholders during the early stages of the planning process and written into a consensual charter, guiding future decisions.

Based on these values, actual planning and design decisions can be debated, evaluated and confirmed in a rational framework. But before any issues, controversies and debates begin, the participants must debate over the value-based principles that act as a kind of a constitution against which any argument or any decision must be evaluated and judged. These axioms had gelled into a firm list of ten themes just as I began to prepare the capital plan of Bhutan. These Principles of Intelligent Urbanism were the basis upon which the Thimphu Structure Plan, local area plans and land pooling proposals could proceed in organizing the capital plan for the Himalayan Kingdom of Bhutan. Let me describe these principles briefly.

1. The first principle, Balance with Nature, emphasizes the distinction between utilizing natural resources and exploiting them. It focuses on a threshold beyond which deforestation, soil erosion, aquifer depletion, silting and flooding catalyzes one another in urban development, thereby destroying the natural environment. The principle promotes environmental impact assessments to identify common resources, natural habitats, bio-diversity, threatened ecosystems and utilization thresholds that can be protected through conservation, density control, land use planning and open-space management.
2. The second principle, Balance with Tradition, integrates planned interventions with existing cultural assets in consonance with traditional patterns and practices. It respects heritage precincts, historical assets and precedents of style that weave the past and the future into a continuity of values.
3. Appropriate Technology promotes building materials, construction techniques, infrastructural systems and management practices consistent with people’s capacities, geo-climatic conditions, local resources and investment capabilities.
4. Conviviality sponsors social interaction through public spaces in a hierarchy of civic places devised for interactive life (personal contemplation, companionship, romance, house-holding, neighborliness, the practice of community and public civic debate). It promotes basic

community units called urban villages that serve clusters of smaller neighborhoods within them, agglomerating into the form of a walking city. Most important, it promotes civility through logical debate and rational consensus amongst the population.

5. Efficiency promotes a balance between the consumption of resources like energy, time and financial expenditure that define “effort,” with planned achievements in comfort, safety, security, access, tenure and hygiene. It encourages optimum sharing of land, roads, facilities, services and infrastructural networks, thereby reducing unit costs and increasing affordability and civic viability. Using intelligent transportation systems, it structures nodes and hubs along urban corridors and networks, optimally reducing travel distances to a minimum. All of this increases physical, social and economic access.
6. Human Scale encourages ground-level, pedestrian-oriented urban arrangements based on anthropometric dimensions, as opposed to machine-scale mammoth buildings and infrastructure. Walkable, mixed-use, pedestrian villages are encouraged as opposed to single-function blocks that need extensive motorways and huge parking lots to connect isolated functions spread over a low-density city.
7. Creative effective Opportunity Matrices enrich the city as a vehicle for personal, social and economic development through access to institutions, services and facilities. These create opportunities for fulfilling basic needs, education, employment, shelter, health, safety, business, social mobility and recreation. This approach sees settlements as vehicles empowering and facilitating people to achieve their optimal capacities and future dreams. A good plan prioritises human resources development, creative occupational engagement and the involvement of its residents in inspiring livelihood activities.
8. The principle of Regional Integration envisions cities as an organic part of larger environmental, socio-economic and cultural-geographical systems essential for civic sustenance.
9. Balanced Movement promotes integrated transport systems of walkways, cycle paths, express bus-lanes, light rail-transit corridors and automobile channels. The modal split points between these movement systems become public domains around which high density residential clusters, urban hubs and mixed-use villages emerge.
10. Institutional Integrity, the last principle, recognizes that good practices inherent in these principles can only be realized through accountable, transparent, competent and participatory local governance founded on an appropriate data base, entitlements and civic duties.

The Principles of Intelligent Urbanism promote a range of facilitative urban development management tools, and good practices, to achieve rational urban processes, systems and forms.

I have always seen cities as essential vehicles through which humanity’s rustic nature is transformed into refined civility. Civilization has emerged from the cauldron of urban dialogue and the evolution of civic ideas. It is only in cities that minorities are empowered and facilitated to optimally utilize their individual talents and capabilities. I see the ultimate purpose of cities as nurturing creativity and catalyzing transcendental moments of ecstasy.

My Experience in Bhutan

An ancient culture spreading across the Tibetan Plateau, including Tibet, Ladakh, Nepal, Mustang, Sikkim, and Bhutan evolved over thousands of years into a great civilization, with Buddhism as its spiritual path and a unique set of mores, cuisines, dress habits, and architecture, that adapted to the desert highlands of Ladakh and to the rainy forests of Bhutan.

The modern project of nation building left Bhutan as the only society that is a “living Himalayan civilization,” with the other entities having been incorporated into larger cultures and nations. Bhutan entered the twentieth century as a medieval kingdom isolated by its arduous mountain passes and protected by its mountainous terrain.

When I visited Bhutan in the late 1970s as one of the few Caucasians allowed entry, its capital city Thimphu had a population of about eight thousand people. There was no airport, less than a hundred telephones, and only jeep tracks to move through the mountainous valleys between scattered settlements. Governance was administered from ancient fortress monasteries, known as *dzongs*, that dominated each valley. National planning had begun in the 1970s with a lead sector of hydroelectric power identified to drive the economy. Its success brought a modicum of national wealth, enabling a range of development activities.

By the beginning of the new millennium, urbanization had gathered momentum, and many youngsters were studying advanced courses in India. Seeing the decline of monarchs across the world, His Majesty set in motion several fundamental transformations. One was introducing a democratic constitution, and another was enhancing communications through a national airline, improved roads, and mobile phones. A third strategy was to open up the society through limited tourism in the luxury sector. Banking institutions were modernized, encouraging people to become entrepreneurs. Realizing the importance of cities to expand its businesses; house an expanding administration; cater to tourists; and to bring education and healthcare to the people, city planning emerged as a national priority.

By the year 2001, Thimphu's population had grown chaotically to thirty-seven thousand people, and the Royal Government needed to act quickly to introduce modern infrastructure. It was at this critical juncture that I was called to the kingdom again to engage in the planning of the nation's capital city.

Thimphu: From Village to Capital

In the late 1970s, the United Nations asked me to tour Bhutan to assess whether my rural development concepts from India could be applied to the kingdom. His Majesty insisted that I "see the country," so I set out in a Land Rover exploring deep into the mountains. At that time, I did not realize that Bhutan would make up a large slice of my life; that I would replan two border towns, a hill town; design Denchi, a new town; or, that I would plan the capital city, its Supreme Court and many of the key government buildings.

Thimphu's elevation of seven thousand feet above sea level, with its hilltop neighborhoods another thousand feet higher, made it one of the highest capitals in the world. Streams flowing down from the mountains bore clear water. Blue pine forests reached up from the town to white snow peaks in the Western distance, and to the east, a steep green hill was lined at the top with colorful prayer flags. Apple orchards occupied the middle zone between the town and the steep pine slopes.

As an outcome of my first visit, I set up a small office in the Ministry of Agriculture with four planners, from where we prepared the first integrated area development plans of the country (1980-86).

When I began preparing the capital plan in 2001, the main road Narzim Lam was crowded with five-storied buildings, and bungalows were being built in the villages along the Wang Chu River running through the valley. The massive fortress monastery, the Trashichhoe Dzong, still dominated the valley as the national icon. Many woodworking, auto repair, metal fabrication and artisan workshops had opened. The army

and the national police force had constructed major housing colonies. At a closer look, the streams coming down from the mountains had dramatically widened and deepened, the Wang Chu River was brown with silt, and houses had begun to appear on the upper hills of the valley. The orchards were being cut, and one could see erosion on the mountainsides. Shangri-La was in danger!

The Themes of the Thimphu Structure Plan

The Thimphu Capital Plan was first and foremost an environmental plan based on a detailed assessment of topography, slopes, hydrology, biodiversity, fauna, flora and human habitat. Ecologically fragile zones were identified, and seasonal bird habitats were demarcated. The interrelations between natural resources systems were analyzed, and the impact of various development options evaluated. Our proposed development control rules were largely regulations to protect the fragile ecosystem.

The plan's second theme was to concentrate growth in urban villages. Each was centered on a village square that had an express bus stop, a day-care center, medical shop, café, gym and other amenities. Ground plus three or four-storied walk-up apartments clustered near the village squares, and lower densities spread off with cycle tracks to reach lower-density cottages.

The third theme was to create an urban corridor, or stem, along which the urban villages would be located. This corridor would have space to accommodate trunk sewerage pipes and electrical and water supply lines.

Another theme was to define the urban core and to pedestrianize it to the maximum. A "charge-to-park" scheme was implemented and a pedestrian system designed connecting the upper markets to the main Sunday market along the river's edge.

As Open Space System was identified, interconnecting the riverfront parks, biodiversity pockets, playgrounds, gardens



Figure 3: Thimphu, Buthan's capital, spreading along the Wang Chu River Valley marked by steep mountains. (photo from www.bjokabhutan.com.bt)

and reserved areas. A promenade was designed along the river, with a jogging track and bike path. A contour line was identified running above and around the city, along which a paved pedestrian path and picnic spots were to be placed. This loop demarcated the city below it from the no-build zone on the steeper and higher slopes above it. Urban precincts with unique characteristics were defined, and each would have its unique development control rules. Some were heritage areas; the urban core was another; and bungalow areas, as opposed to apartment areas, were others. Workshops and *godowns* (warehouses) were gathered into a specific type of precinct. The concept was to separate non-conforming uses while encouraging mixed uses.

Identifying urban assets and linking them to the open-space system was a theme that protected heritage buildings, religious structures, and national monuments, giving them special protection. The Wang Chu River and its streams were protected with setbacks from their edges. A structure plan for the entire city was prepared to identify major road arteries, water bodies, national heritage structures and open spaces. After designing the trunk infrastructure components, the local area plans were fit into this pattern.

The structure plan was discussed and openly debated with the stakeholders and chamber of commerce before being finalized. Local area plans were prepared for each of the fifteen watersheds along the river where traditional villages had emerged. Land pooling was employed wherein each landlord deposited their land in a land bank and the local area was then laid out with accessibility to each plot. Ten percent of the land was left for open spaces and five percent for amenities. An additional twenty percent was allotted for roads. The remaining land was redistributed to the original owners, near their original land holdings. When returned to the owners, the smaller areas were worth many more times their original value.

The Thimphu Capital Plan broke from standard practices of regulatory planning born out of romantically high, Western standards. It addressed ability to pay, accessibility to shelter and livelihood through mixed use and site and services measures. High density, walkable neighborhoods, a bicycle track system, and a rapid bus network transformed the transit scenario, reducing dependency on automobiles. Dissuading people from driving to the city centre through high parking fees encouraged them to use public transport. The planning process involved stakeholders.

The plan was an organic one, fitting within the valley contours, rather than forcing a Cartesian grid upon a natural landscape. Zoning and mono-functional areas were dispensed with and, instead, precincts with traditional functions and uses were created. Most of all, the plan showed the way for planning Green Cities in Asia, respecting the carrying capacity of the land, protecting fragile water edges, honoring biodiversity areas and planning in response to environmental assessments. The Thim-



Figure 4: The Thimphu Structure Plan.

phu Plan introduced fundamental concepts for promoting the idea of a green city.

Denchi New Town: The Theme of Decentralization

Bhutan has the lowest density of any country in Asia with its small villages spread across rugged mountains, often accessible only along footpaths. Urbanization has concentrated in the western region of the country, with Thimphu, Phuentsholing and Paro growing the fastest. Industries have developed along the south-western border with India. Major hydroelectric projects--and tourism too--have concentrated in the western region.

Health, education and administrative facilities are located in Thimphu, resulting in a backlog of development in the east, where specialized medical and higher education facilities are missing. This imbalance was a major consideration for developing a new town in the eastern region of Bhutan. There was a need for a second capital in the east, and the new town of Denchi marked the beginning of this process.

A relatively level site in the district of Pemagatshel, at a low elevation, was selected for the new town's location. The site lay on a point affording views up and down the Marung Chhu and Brongkola Chhu River valleys. Whatever government facilities were in the present town of Pemagatshel, lay scattered along the main district road, where there were also about thirty makeshift shops. There are no proper housing facilities for administrators and technical staff. Lack of schools and health facilities pose a deterrent for educated families to live in the area.

Denchi was envisioned to be a model hill town and administrative capital of the eastern region. The proposed town centre,

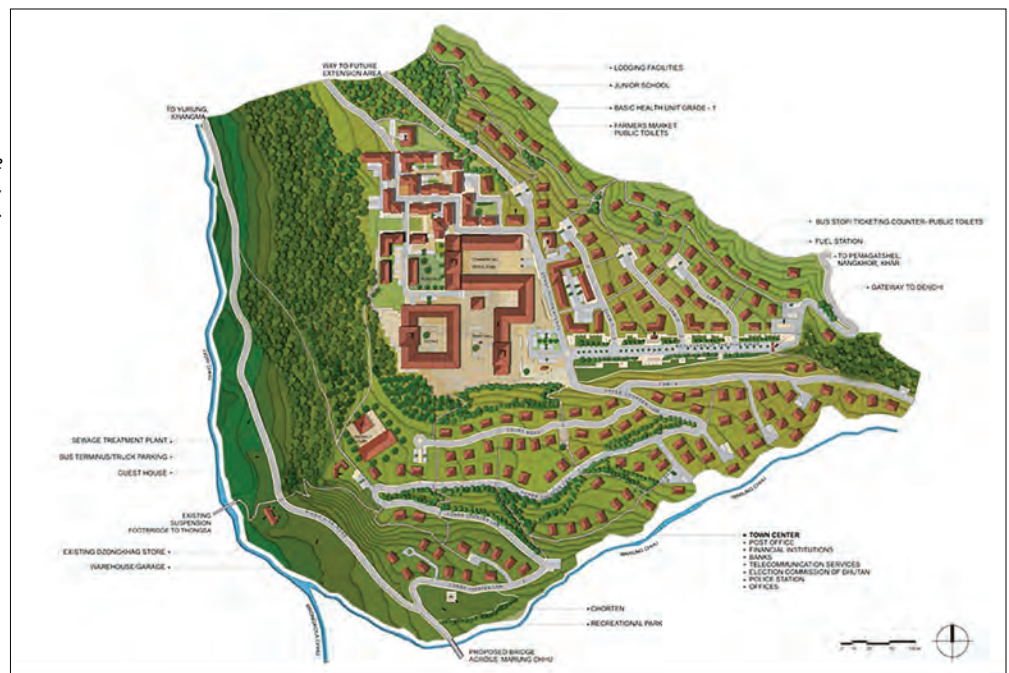
with an administrative *dzong*, was the governing factor for the initiation of the plan and would drive expected future growth. Thus, it was a mandate for the new town to provide space to build apartment buildings for more than two hundred families, cottage plots for another one hundred and fifty families, a health centre, a secondary school, lower schools, a town hall, a district court, a shopping centre, a fuel centre and an administrative centre to be housed in a new *dzong*. Offices for private businesses were to be provided in the town centre.

The physical planning challenge lay in creating accessibility throughout a small site of forty-six hectares whose elevation descended one hundred and eighty metres across that short distance. Another twenty hectares were reserved for future town extension. The site lay nine hundred metres above sea level, or about six hundred metres below the present Pemagatshel administrative facilities, making it warmer and less expensive to heat in the winter.

The major components of the new town were its road system, storm drainage, street lightening, sewerage management and water supply infrastructure; the administrative centre or *dzong*; the central market and commercial offices; the high density apartments, health care centre and school; the high court; plotted development for cottages; and a lower-level road along the river for workshops, auto repairs; storage and small scale industries.

It was envisioned that local masons and woodworkers, employing local materials and techniques, would build the town's infrastructure. Accordingly, the imagery of the town was created around traditional Bhutanese themes of built form and iconographic imagery.

Figure 5: The town centre and administrative area, Denchi New Town.





Strategies for District Capitals

Early in 2003, the Prime Minister of Bhutan informed me of the Royal Government's decision to urgently develop three of the nation's district capitals into unique growth centres that would help jump-start the nation's economy. With a rising number of graduates, there were higher demands for employment in managerial and technical positions. Manual labour was in short supply. Unless new jobs could be created, the spectre of unemployed youth would emerge in an aspirational society, fueled by its opening to the World Wide Web, mobiles and multi-channel television. Students were going to India to study in hundreds and subsequently in thousands. Could they not study in Bhutan itself? Where would they work? Could a modern society gain a right livelihood from a subsistence agriculture base?

The Cabinet emphasized the opportunities to harness Bhutan's cheap electricity, abundant raw materials like bauxite and timber, combined with inexpensive Indian labour just over the border. This combination offered a magical opportunity for young Bhutanese entrepreneurs, managers and technicians. They could create and operate a new industrial belt bordering India if the settlements along that zone had industrial parks, communications and the social services to support them. A Bhutanese dream of a better life was emerging, and redeveloped towns offered a golden opportunity to realize that dream and decentralize growth from Thimphu.

Three towns were selected, including Samtse and Gelephu whose municipal boundaries shared borders with India. These could become centres of industries and exports. Damphu, the capital of Tsirang District, was chosen to become a Knowledge City, as it was at a moderate elevation, suitable for year-round operations, and was more central to the nation's population. It was also close enough to India to develop as a tourist retreat during summers, due to its mild climate and green forests.

Figure 6 to 9: Views of the town centre and administrative area, Denchi New Town.



The planning approaches gleaned lessons from Thimphu. A structure plan was prepared for each settlement, with the non-negotiable trunk infrastructure, ecologically fragile areas and heritage sites protected and integrated. Local area plans were prepared, applying land pooling and public participation. Unique precincts were identified, and urban villages became the basic socio-economic planning units, assuring that all urban necessities were within walking distance, including an express bus stop. In each case, efforts were made to direct traffic around the settlements, via bypasses. Most of all, each city plan kept balance with nature and with tradition as the pillars of development. The ten Principles of Intelligent Urbanism (see Figure 1 above) were the underpinning value system upon which each plan was crafted.

Samtse: The Theme of Symbiotic Opportunities

Samtse represented the larger opportunities found in the small places scattered along the border with India. Accessible to Bhutan only via a road cutting across the northern plains of India, Samtse combined the resources of bauxite, cheap electric power and inexpensive labour within cycling distance across the border. An existing cement factory and established small-scale industries had set in motion an export-oriented economy. A pleasant small town had developed around a small central park, and serviced a lineal region spread to the west, running along the border with India.

The scenario threw up problems that could be easily solved, and the result would become a model for other towns. In this apparently simple conundrum lay the significance of the planning project itself.

First, the town needed basic public health infrastructure: potable water, storm drains, waste collection, and sewerage management; these were planned for. The town needed an orderly system of public roads, footpaths, drains, streetlights

and bus stops. The town also required an open space system with playgrounds, gardens and conservation areas; these were planned for. Additionally, a planned commercial core and residential neighborhoods with schools, clinics and amenities were essential. Most of all, the town needed an economic base from which to draw sustenance in the form of incomes and a municipal tax base. For this, a large area was delineated for industrial development, planned in a manner that allowed trucks with goods and buses carrying workers to come and go without entering the main town. This small town plan became a model for further urban development actions.

Gelephu: The Theme of an Economic Engine

Gelephu offered huge potentials and opportunities to develop the nation. Located on a large open plain between the Mao River to the east; the cliff-like edge of the Himalayan mountains to the north, curving around to the west; and the Indo-Bhutan border to the south; the city offered one of the flattest areas in the country for urban development. There was ample and willing labour just across the border and a major electric line carrying power towards India, with more to come! This augured well for the creation of a future city of industry. There was space for an airstrip aligned with the border, taking advantage of the no-build strip there, in the correct direction for aircraft movements. A broad gauge rail line in India could be extended up to Gelephu bringing in engineered goods for the country's infrastructure expansion, for its new power plants, and for exporting finished goods from Bhutan, employing cheap power, ample raw materials and Bhutan's young labour force.

The city could become the central gateway to the Kingdom, a large industrial centre, and a dry port, with rail connections south to Assam, Bangladesh and the Subcontinent. The plan envisioned a new town core and redevelopment of the old town core, linking the two with a major boulevard. A number of urban villages, each with its own village square, with an

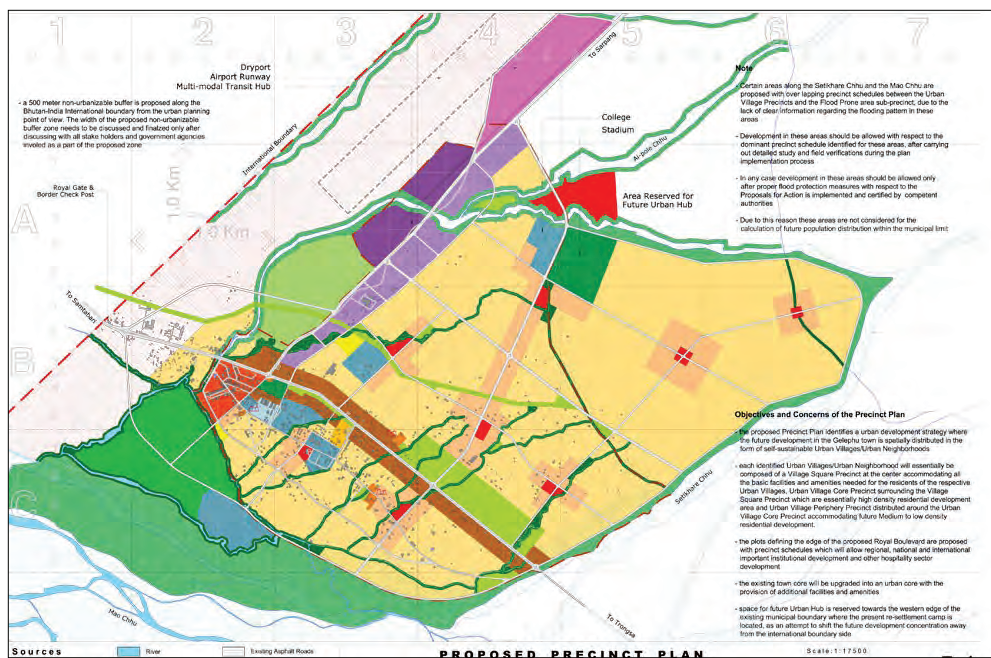


Figure 10: The master plan for Gelephu envisioned it to become a gateway to Bhutan from Assam, Bangladesh, and the Subcontinent.

express bus stop would link the new city into a hierarchy of open spaces, through connecting green corridors. A large industrial zone, running twenty kilometers to the west along the border was planned with a central transport hub managing immigration and welcoming visitors. This multi-modal hub would connect the airport lounges, the railway station hall, a bus terminus and a taxi stand, each on one of the sides of a central atrium with amenities and an interior garden.

The thrust of the city plan was to morph the local economy from one of consumption and service activities into one of the economic-base activities that would export value-added goods, catalyzing an inflow of capital to Bhutan. This was a large-scale vision requiring planning at the international, national, and the local level.

Damphu: The Theme of a Knowledge City

For some years the town of Damphu was accessible only by crossing the Indian plains from other southern Bhutanese settlements. With a new highway entering Damphu from the north, it became well connected to the capital and the central region of Bhutan. It had always been a centre of citrus cultivation and spices. In addition to which it boasted of higher literacy and educational achievements, and its salubrious climate augured well for residential schools and colleges.

The town was selected for three reasons: one, to improve the level of governance in the district by enhancing services and facilities in the centrally located capital; two, it could easily be developed into a tourist centre by the private sector; and, three the town could morph into a knowledge city with residential secondary schools, colleges, and even an International Centre of Himalayan Studies.

The new plan allocated land for a knowledge precinct and facilitated tourism through building control rules conducive to low-intensity development matching to the carrying capacity of the land. The plan also envisioned rerouting national traffic from the central core through a bypass and organizing the town's internal traffic patterns. New water and sewerage management systems were proposed and environmental management processes were put into place.