

**Balancing Values:**

*Development Strategies that Sustain the Cultural Heritage of Rice Paddies and the Natural Landscape in Thimphu, Bhutan*

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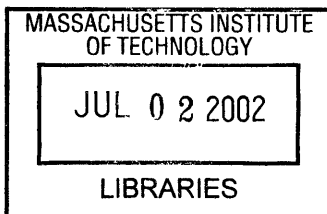
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## **Balancing Values:**

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Rosemary Carolyn Dudley

### **Abstract**

This thesis focuses on the impending urban development of the terraced rice paddies in the valley surrounding Bhutan's capital city, Thimphu. It makes the argument that this unique landscape is deeply rooted in Bhutanese culture and its preservation can provide Bhutan with environmental, cultural and economic benefits. Escalating development pressures are such that the government cannot salvage the paddies at any cost, but sensitive development strategies can mitigate development's impact on the terraced land and the bodies of water that have supported life in the valley for centuries. This thesis argues that it is possible and necessary to absorb the current and predicted growth without obliterating the valley's previous use. The Royal Government's agendas to maintain Bhutan's living cultural heritage, sustainable "middle path" development strategy, and self-sufficiency cannot be fulfilled if agricultural land is not valued as a resource. Issues of government capacity, coordination between the Ministries, reliance on modern methods of development, and the exclusion of agricultural land in the nation's conservation efforts have prevented a holistic development plan from being realized.

In response, this thesis offers six guiding principles that can help preserve the cultural, agricultural, and natural landscape. Stressing the environmental and cultural risks involved in rapid development of the traditional landscape, the principles offer recommendations to value traditional sources of livelihood, undeveloped land, environmentally and culturally sensitive development, and the inclusion of communities through participation. They provide sustainable development approaches that balance and recognize the cultural, environmental, and economic value of the farmland and existing housing settlements. An overview of international urban development precedents that demonstrate these principles offer insight on how Bhutan can remedy these risks and benefit economically. Last, specific mechanisms that can guide the government in their development process will make preservation of the traditional landscape realistic. In conclusion, Bhutan can provide culturally and environmentally sensitive urban development that does not detrimentally impact the landscape and its inhabitants.

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# **Balancing Values:**

*Development Strategies that Sustain the Cultural Heritage of Rice Paddies and the Natural Landscape in Thimphu, Bhutan*



*By Rosemary Dudley*



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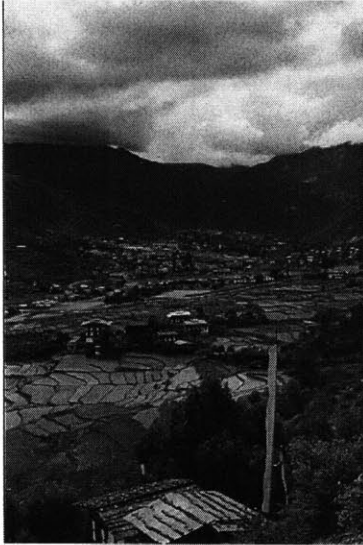
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**The Thimphu Valley Today**  
*In the foreground, traditional farmhouses are surrounded by rice paddies. Thimphu's urban center is in the distance.*

## Preface

This thesis arose out of lasting first impressions of the valleys between Paro and Thimphu during my first hour in Bhutan. The landscape and traditional buildings were unlike anything I had seen. As we drove along the narrow road overlooking the valley's green rice terraces and traditional farmhouses, I was in awe. The care evident in the use of the land, in the design of the homes, and on peoples' faces was surprisingly different than that displayed in my own country.

This first hour marked the beginning of three weeks of intense analysis of the capital city of Thimphu. Along with eight other MIT faculty and students, I participated as a consultant in the Ministry of Communication's Urban Management Course held in the Royal Kingdom of Bhutan. In preparation for the seminar, we created three urban expansion scenarios for Thimphu, which the course participants used to explore the costs and benefits, as well as the necessary trade-offs that accompanied each development alternative. We studied the effects of urban growth and development on the natural environment and local populations. Using scenario-building techniques, we worked with local planners, architects and engineers to discuss the possible directions of future growth. The experience proved rewarding to us as student facilitators and to the local participants. It opened our eyes to the great potential of planning strategies in a country undergoing considerable change and left three of us with the desire to return to transform the scenario-building efforts into a practical, applicable analysis of Thimphu in the form of three Masters theses. While all three theses address how Bhutan can maintain its living cultural heritage in times of rapid urbanization, each thesis focuses on a specific aspect of the built environment. The other two theses entitled, *Preservation without Boundaries: Transitioning Traditional Settlements into an Urban Environment* by Rachel Loeb and *Housing Quality and Traditionally Built Construction: A New Practice and Urban Paradigm in Bhutan* by Alexis Bennett, analyze how traditional villages and architecture can reflect a living cultural heritage as the country urbanizes.

The timing of this research is of particular importance because globalization and access to information is just beginning to influence the Bhutanese lifestyle, cultural values and traditions. This period of transformation places Bhutan in a precarious position, particularly susceptible to progressive or destructive planning initiatives. Having seen what the United States and other developed countries are capable of doing to their own precious landscapes, I was determined to put forth some energy to help sustain what most strongly defined my impression of the Thimphu valley: the rice paddies.

To further my research, I returned in January 2002 to conduct field

analysis and stakeholder interviews with government officials and staff, farmers, and professionals about the role of rice paddies and the natural environment in the historical and cultural context, as well as in Thimphu's current development plans. To honor the privacy of individuals who have shared their honest opinions on the development of Thimphu, I have referred generally to the potentially controversial sentiments voiced.

While my research acknowledges the wonder and beauty of Bhutan, it also critiques the trends and decisions that appear to be transforming the country's urban landscape into a generic expression of globalization. My criticism is not meant to deny my own country's imperfections. The magnitude of inefficiencies and contradictions which the United States has used to guide its development is not forgotten. Ian McHarg, internationally known landscape architect and planner, helps convey my recognition of the destructive results of the "American way" in the following description:

Show me a man oriented society in which it is believed that reality exists only because man can perceive it, that the cosmos is a structure erected to support man on its pinnacles, that man exclusively is divine and given dominion over all things, indeed that God is made in the image of man, and I will predict the nature of its cities and landscapes.

I need not look far for we have seen them—the hot dog stands, the neon shill, the ticky-tacky houses, dysgenic city and mined landscapes... He seeks not unity of nature but conquest.<sup>1</sup>

Thus, my belief is that Bhutan can take advantage of its distinct position, move away from these mistakes and continue to thrive as a nation with unequaled cultural integrity.

## Introduction

Finding suitable development strategies that meet the needs of growing populations *and* sustain the environment and culture is a global dilemma. Yet, despite the global similarities, Bhutan remains historically and culturally unique from the rest of the world. A progressive country dedicated to upholding environmental conservation, self-sufficiency, sustainable development, and a living cultural heritage, Bhutan struggles to balance its values in the face of urbanization.

To provide an overview of Bhutan's spiritual and historical relationship with the land and specifically, agricultural practice, Chapter One will introduce the environmentally and culturally integrated framework through which Bhutan has developed. In this chapter, the Buddhist treatment of all living things is presented to show how the Royal Government of Bhutan has incorporated these ethics into their development and conservation regulations. With the historical background established, Chapter Two then addresses the current situation in Thimphu. While the traditional values expressed in Chapter One are still evident today, they are challenged by current development trends, housing shortages, and the age-old quest for economic gain. Chapter Two describes how these pressures have impacted the valley's development and prevented Thimphu from fully realizing the national agenda of preserving cultural heritage and environmental conservation. Chapter Three reviews the wide array of environmental protection legislation and less thorough development regulation to highlight where increased coordination, staff capacity, and government commitment can help the Royal Government implement their goals effectively. To reiterate the global relevance of these pressures and show how Thimphu can learn from the mistakes and progress from other regions, Chapter Four will introduce five international precedents. The specific lessons from each of these regions and the six guiding development principles will be applied directly to Thimphu. Chapter Five will then offer practical mechanisms and incentives that are necessary to implement and enforce the development guidelines. To conclude, the final summary will reemphasize the benefits that Bhutan can enjoy by incorporating the recommendations to help strengthen Thimphu's future as a healthy and vital city.

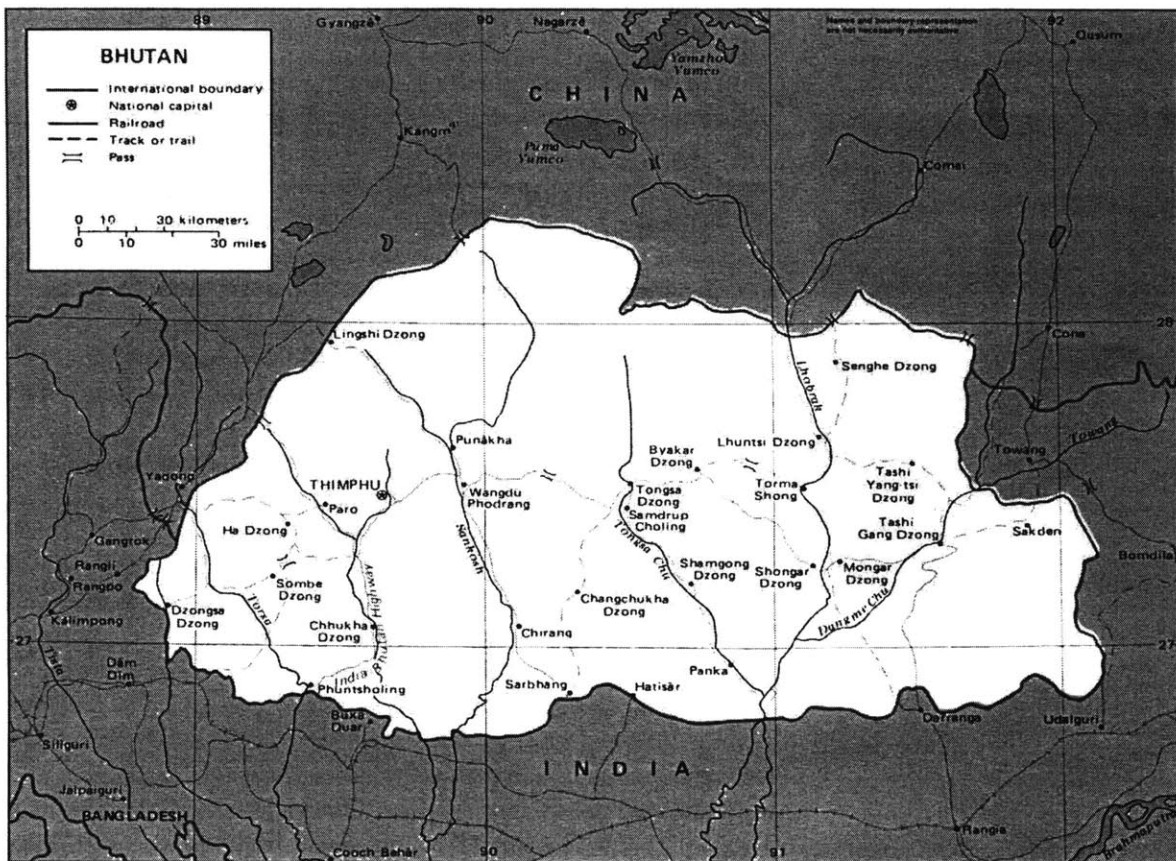
*Note: Unless otherwise cited, all images were created by the author*

## A Glimpse of Bhutan

*"Bhutan's late entry into the development process has meant that it has been able to avoid many of the unfortunate trappings of unbridled modernization, including the undermining of its cultural and religious traditions. This late start has been a blessing in disguise, as we have been able to learn from the mistakes of others who have trodden the path before us."*

**C. Dorji, Planning Commission Minister <sup>2</sup>**

Located in the Himalayan region with elevations ranging from 150 to 7,500 meters, Bhutan has only 7% of its total land area of 46,500 sq km suitable for farmland.<sup>3</sup> The magnitude of steep slopes and a commitment to forest maintenance leaves little land for farming. Historically, the concentrations of farmable land have surrounded the townships of Tashigang, Yangtse, Mongar, Lhunsi, Bumthang, Wangdiphodrang, Punakha, Paro, and Thimphu.<sup>4</sup> Many of these townships are quickly developing into the country's largest urban centers. They have been the first areas to experience dense population growth. The valleys that once attracted populations because of their rich soil, access to river water, and flat, farmable land are now the



Source: [http://www.lib.utexas.edu/maps/middle\\_east\\_and\\_asia/bhutan.jpg](http://www.lib.utexas.edu/maps/middle_east_and_asia/bhutan.jpg)

prime areas for urban development. This thesis focuses on the Thimphu valley. Previously entirely farmland, the extended valley has recently become part of Thimphu's municipal boundary and thus, has lost all protections against development. The country risks losing all of its cultivation if its valleys' farmland continues to be converted to municipal land. Currently, the country imports the majority of its rice from India. Up until fifteen years ago, ninety percent of Bhutanese were farmers or had some relationship with agriculture. While the current percentage of farmers and livestock rearers today ranges between 85-94%, the predicted urban growth rate of 7-10% signifies the increasing trend in rural to urban migration. Thus, the Bhutanese relationship with the land is changing rapidly. If no priority is given to maintaining the farmland in and around the valleys as they transition into urban centers, a great deal of Bhutan's cultural lifestyle will be lost. Thus, as the combination of these factors demonstrates, the need to sustain farmland is integral in maintaining the Royal Government's agenda to be self-sufficient and preserve its living cultural heritage.ϕ

## **The Global Picture: The effect of urbanizing populations' housing settlements on the environment and culture**

Bhutan is not alone in its balancing act of cultural values, modernization, and economic development. In this era of globalization and urbanization, countries worldwide are struggling to balance the impending development pressures resulting from population needs and the desire for economic gain with environmental resources and traditional ways of life. Many countries are now recognizing the interdependence of their cultural and natural resources, which previously were considered separate issues. The global strain on natural, agricultural and cultural resources is especially relevant to Bhutan as it develops and attempts to secure a self-sufficient and sustainable future.



*A disappearing glimpse of Thimphu's rice paddies framed by a window in a traditional rammed earth farmhouse*

A frequently voiced argument against agricultural preservation in Bhutan is that the country can continue to import its food products from other countries. Yet, this argument is neither supportive of self-sufficiency nor aware of the global reality. Like Bhutan, countries throughout Asia—the Philippines, Thailand, Japan, Korea, and Vietnam specifically—are struggling to maintain their countries' traditional source of livelihood: rice cultivation. The rice paddies and the rice farmer are endangered everywhere. There are 250 million rice farms in Asia and most are less than 1 hectare.<sup>5</sup> Three of the world's four most populous nations are rice-based societies: China, India, and Indonesia and two of those nations, China and India, border Bhutan. Together, they have nearly 2.5 billion people—almost half the world's

population.<sup>6</sup> Yet across Asia, investment in rice paddies is decreasing and their total land area is correspondingly diminishing. Although advanced technology has allowed less land to yield higher rates of agricultural production, these techniques are not necessarily environmentally or culturally sensitive. The Asia Rice Foundation explains, “One of the many reasons for this alarming trend is the usual tendency to ignore the ecological value in evaluating the overall importance and contribution to society of the rice paddy.”<sup>7</sup> Further, the Foundation continues:

Rice farming, if it is to be attractive to future generations, must be transformed into a respected and economically profitable profession. More Asians must become more conscious of the importance of rice in their lives. And the priceless rice cultural heritage must also be preserved for the education and enjoyment of posterity.<sup>8</sup>

These warnings articulate the risk that diminishing quantities of rice and rice farms will have on food production throughout Asia. Yet, they only begin to touch upon the cultural significance of rice farming.

In 1995, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) classified century-old Ifugao rice paddies in the Philippines as a World Heritage site, which served as a technique to protect the cultural environment that previously had not been recognized as such.<sup>9</sup> The recognition of the agricultural landscape as a culturally significant heritage site validates farmland as a cultural and environmental resource. Like Bhutan, this province has been able to preserve much of their culture from ancient times to the present. Yet, in December 2001 UNESCSO put them on their endangered list because of poor management.<sup>10</sup> If significant efforts are not made to preserve and restore the terraces, in ten years they will be lost, despite their World Heritage site status.

At a recent seminar on the Conservation of Asian Cultural Heritage, Richard Engelhardt, the UNESCO Regional Advisor for Culture in Asia and the Pacific, noted that much of Asia’s cultural landscape is in danger of environmental degradation as a result of, “soil erosion caused by deforestation; lowering of the water table, also caused by the deforestation and by large-scale water control projects; and water and air-borne chemical pollutants.”<sup>11</sup> As a result of these factors and natural weather conditions, countries globally are facing the dilemma of implementing new strategies for preservation.

As Bhutan continues to face similar pressures in their urbanizing centers, they too risk losing the land that has retained its cultural and environmental qualities. Thus, to begin to comprehensively respond to the strain on Bhutan’s natural resources and cultural values, this



*Submerged rice in a typical paddy.*



*The Ifugao Rice Terraces*

*Source: [members.tripod.com/billedo/banaue.html](http://members.tripod.com/billedo/banaue.html)*

analysis has identified the following principles to help guide the Royal Government of Bhutan toward their goal of sustainable development. The principles aim to protect the paddies and surrounding natural environment in a realistic manner that balances growth requirements with the preservation of the cultural landscape:

- 1. Recognize traditional sources of livelihood as an integral part of Bhutanese history and culture:**  
Include and respect traditional farming in the discussion and planning of a living cultural heritage
- 2. Value Undeveloped Land:**  
Acknowledging that not all land can be developed, identify the value in wildlife habitat, stormwater detention, passive recreation, and agricultural land when determining what areas to leave undeveloped.
- 3. Use Sensitive Development Techniques:**  
Respect the natural site conditions and traditional settlement patterns by taking cues from the past settlement patterns and the natural landscape.
- 4. Find Economic Value in Environmentally-Sensitive Development:**  
Recognize that environmentally sensitive design can achieve more profitable development in the long-term because unconventional strategies can yield more lots, less wasted space, and creative waste management systems.
- 5. Control and Treat Runoff:**  
Understand and prevent the detrimental impact additional, untreated stormwater runoff resulting from development can have on the river, the watershed, and the life they support.
- 6. Make Citizen Participation a Priority:**  
Include citizens in all phases of development to ensure a successful end product that directly benefits the communities affected by development.

These principles will be directly applied to Bhutan in Chapters Four and Five once the significance of Bhutan's historical and cultural relationship to the land, the intricacies of the current situation in Thimphu and the supporting legislation are discussed in Chapters One, Two and Three, respectively.

## End Notes

<sup>1</sup> McHarg, 1997, 24.

<sup>2</sup> Biodiversity Action Plan, 1997, 2.

<sup>3</sup> Karan, 1987, 71.

<sup>4</sup> Karan, 1987, 74.

φ The definition of self-sufficiency is currently under debate in Bhutan. Some define it as the country's capacity to produce all that it needs and sustain itself internally. While others define it as having the means to purchase what the country needs elsewhere. This thesis defines it according to the Merriam Webster Dictionary as "able to maintain oneself or itself without outside aid: capable of providing for one's own needs."

<sup>5</sup> <http://www.asiarice.org/sections/whatsnew/what'snews.html#new>

<sup>6</sup> <http://www.asiarice.org/sections/whatsnew/what'snews.html#new>

<sup>7</sup> <http://www.asiarice.org>

<sup>8</sup> <http://www.asiarice.org/sections/aboutasiarice.html>

<sup>9</sup> Cabrera, December 20, 2001

<sup>10</sup> Cabrera, December 20, 2001

<sup>11</sup> Engelhardt, 1.



# Chapter One:

## *Bhutan's Relationship with the Land*



*The Thimphu valley before the late 1960s*

*Source: Karan, Pradyumna P. 1967. *Bhutan: A physical and cultural geography*. Lexington: University of Kentucky Press.*

## Bhutan's Cultural Relationship with the Natural Environment

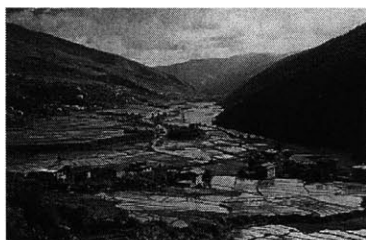
*"Conservation is an intrinsic part of the Buddhist ethos which has helped preserve Bhutan's natural environment for generations."*<sup>1</sup>

Sanjay Acharya, Historian

Bhutan is considered a global anomaly. The country has gained a reputation for its rare ability to preserve its extraordinary natural resources and distinct culture—resources that have long been lost in so many developed and developing countries. Their fortunate predicament has not been the result of luck. Situated between two of the most densely populated countries in the world, India and China, and without "military might or economic strength, the Royal Government of Bhutan recognizes the preservation and promotion of its distinct cultural identity as an important means for its survival as an independent and sovereign kingdom."<sup>2</sup> Since its inauguration in 1907, the government has allowed their cultural beliefs to influence their decisions about preservation, conservation, and growth. This chapter will present these beliefs to show how they have shaped Bhutan's historical relationship with the land and how today, with the pressures of urbanization, they are challenged.



*Spiritual prayer flags overlook the Thimphu valley.*



*The Wang Chu River and the new expressway (currently under construction) wind through the southern Thimphu Valley bordering the rice paddies.*

As the last remaining country to practice Mahayana Buddhism, Bhutan has upheld its religious values in all aspects of governance. Buddhism has played an influential role in the culture and lifestyle of the Bhutanese. Integral to Mahayana Buddhism is the philosophy that the utmost respect must be paid to all living things. This belief is rooted in the ideology that Buddha taught. As quoted in the Biodiversity Action Plan:

...cultivate boundless love towards all beings in the manner a mother would protect her only child at the risk of her own life. In the continuous cycle of birth and death, there is not a single being that has not been, at one point of time or another, our mother. Therefore, the Buddha taught to respect all life forms in a manner that we respect our mother.<sup>3</sup>

Consequently, the Bhutanese consider all forms of life sacred. All natural elements, including lakes, rivers, soil, trees, and mountains are home to the deities that they worship and have elaborate historical and religious references and symbolism.<sup>4</sup> Those who disrupt these natural elements, "the heaven above, the mountain in between and the land below," will be threatened by the deities' wrath.<sup>5</sup> As a result, the Bhutanese have historically upheld a respectful relationship with their natural environment, and specifically with the land that has sustained life for centuries.

While the small size of Bhutan's population (600,000) has helped the country maintain its position on sustainable development, the Buddhist beliefs, which have shaped the culture for centuries have been especially influential regarding its conservation practices. However, in this time of rapid urban development, the question arises: Will these Buddhist beliefs be able to withstand the increasing pressures of modernization and urbanization? As the population continues to increase, consumer patterns change, and urban development takes over farmland, Bhutan's environmental resources and cultural integrity are threatened. The government is aware of this threat. The National Environment Commission (NEC) Guide Towards Sustainable Development acknowledges that, "the unabated population growth, if unchecked, would negate all development efforts and seriously impair the country's potential for achieving its goal of sustainable development and improving the quality of life of all Bhutanese people."<sup>6</sup> While the desire to sustain their resources and integrity is evident, whether the Bhutanese government has the time and the means to effectively react to these pressures in Thimphu and realize its goals is less clear.

However, this is not the first time in Bhutan's history that the environmental resources have been threatened by economic and development pressures. In the past, when the government made decisions that were later found to have put environmental resources in jeopardy, they were quickly stopped. For example, large timber factories using new technology were erected in the 1980s, which led to immediate deforestation of thousands of acres of land. The government closed the factories upon seeing their effect on the landscape. Similarly, a large hydropower plant aimed to produce 336 megawatts of power was shut down as a result of claims that it had detrimental effects on the ecosystem.<sup>7</sup> <sup>φ</sup>

*The Thimphu valley floor is primarily comprised of rice paddies and clusters of farmhouses.*



Despite the country's history of mitigating potentially destructive physical and economic development projects, today's pressures are different. They are urban. The NEC and the Department of Urban Development and Housing (DUDH), the kingdom's most influential departments on environmental conservation and urban development respectively, are experiencing intense pressure to balance urban growth and environmental conservation. Yet, because the domain of each department is geographically defined, the NEC and its regulations, have little or no influence over the development of urban areas. The decisions that DUDH and Thimphu City Corporation (TCC) make regarding the development of Thimphu go unchallenged by the NEC, the Ministry of Agriculture (MOA), and other environmentally conscious departments because the municipal land lies outside of their jurisdiction. Thus, the current urban development in Thimphu has the potential of veering in either direction. Finding the balance between cultural, environmental, and economic values is crucial.

## **Bhutan's Historical Relationship with the Land:**

*"From the earliest times Bhutanese farming has revolved around paddy rice."*<sup>8</sup>

**Pradyumna P. Karan**

Bhutan's rugged terrain has been both a blessing for its preservation of culture, natural resources, and independence, and a challenge for survival. Steep terrain and harsh weather conditions prevented vehicular travel within the country until the late 1960s when foreign investment supported the construction of national highways. The Bhutanese learned to rely on their own families' ability to provide food and shelter. They crafted intricate irrigation systems and terraced fields along steep hillsides and shallower valleys to support their efforts. This section outlines how the Bhutanese have depended on the land for their survival and how it has shaped their culture and livelihood. The review of this cultural relationship serves to remind the decision-makers of today that agriculture, namely rice farming, cannot be ignored; it is as an integral aspect of Bhutanese culture. The techniques and priorities of the farmers reviewed in this section reveal how the environmentally sensitive, Buddhist ethics that have helped Bhutan conserve its pristine environment for centuries. Serious consideration of these practices will help sustain the natural and agricultural environment throughout the urbanization of Thimphu.

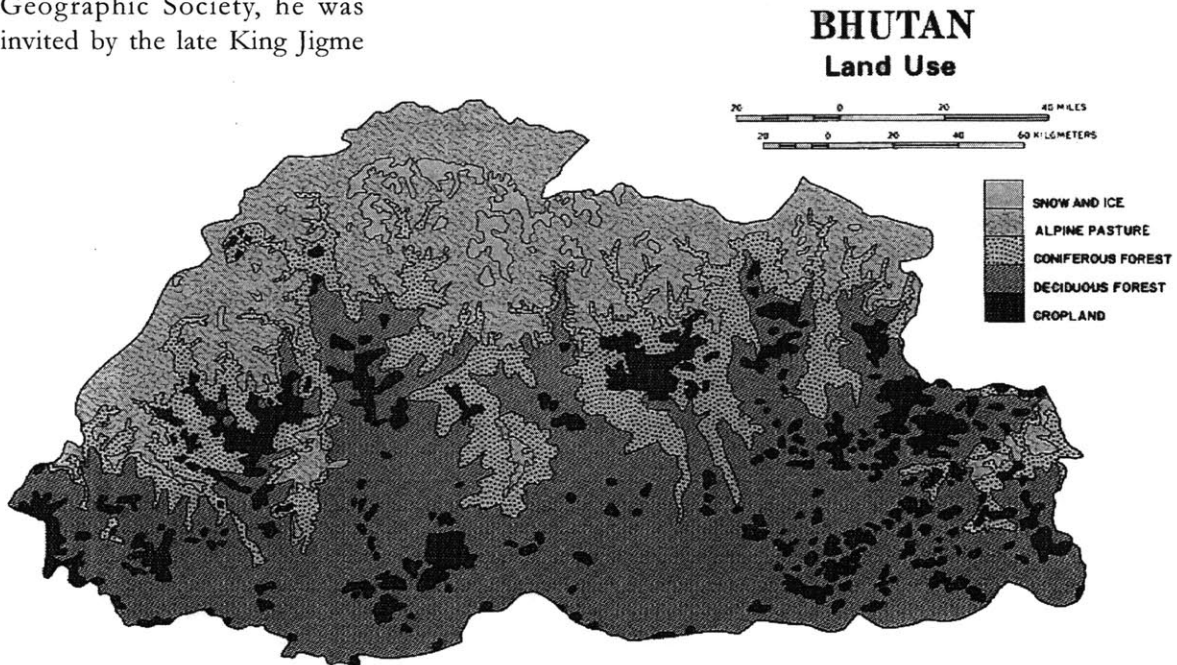
Farming, particularly rice farming, is an integral aspect of Bhutanese culture. Rice cultivation is rooted in the culture of the Bhutanese. The crop itself is considered the "supreme offering to the gods".<sup>9</sup> The terraced landscape of the rice paddies changes throughout the seasons,

responding to the seasons and reminding the Bhutanese of their connection to life in all forms. The paddies are planted in late spring and begin to turn into lush fields by mid summer. Then just before harvest in the fall, the valley glows golden yellow. Even in the winter when most of the paddies are brown and await the spring planting, the terraces' curving walls accent the landscape's contours gracefully.

This section relies heavily on historical analysis performed by Pradyumna Karan, a cultural and environmental geographer, who has written the majority of historical information available about Bhutan's cultural and natural landscape. Supported by the Committee for Research and Exploration of the National Geographic Society, he was invited by the late King Jigme



*This map highlights Bhutan's extensive elevation range.*  
 Source: [http://www.askasia.org/image/maps/ele\\_bhutan.htm](http://www.askasia.org/image/maps/ele_bhutan.htm)



*The predominance of deciduous forest and the scarcity of agricultural land is shown in the land use map above.*

Source: Karan, Pradyumna P. 1987. *Bhutan: Development amid environmental and cultural preservation*. Tokyo: Tokyo University of Foreign Studies Press.

### Bhutan: Regional Distribution of Crop Land

*Karan's tables help to clarify the percentage and breakdown of agricultural land throughout the country.*

Regions	Crop Land	
	Sq. km.	Percent of region's land in crops
Western Bhutan (Ha, Paro, Thimphu, Punakha, Gasa and Wangdiphodrang districts)	438.8	5.5
Central Bhutan (Tongsa, Bumthang, Mongar and Shemgang districts)	377.2	5.6
Eastern Bhutan (Lhuntsi, Tashigang and Pema Gatsel districts)	631.5	15.3
Southern Bhutan (Samdrup Jonkhar, Gaylegphug, Chirang, Dagana and Samchi districts)	1,045.0	10.1
	<u>2,492.5</u>	

Source: Department of Agriculture, Government of Bhutan.

### Bhutan: Regional Distribution of Agricultural Land Types (in thousand hectares)

	Wet Land	Dry Land	Tsheri Land	Horticulture	Others	Total
West Bhutan (Gasa, Ha, Paro, Punakha, Thimphu and Wangdiphodrang)	7.1	6.6	8.4	1.7	0.9	24.7
Central Bhutan (Bumthang, Dagana, Shemgang, Tongsa)	2.2	6.8	7.0	0.4	0.3	16.7
East Bhutan (Lhuntsi, Mongar, Pema Gatsel, Tashigang)	4.6	16.5	11.4	0.3	1.4	34.2
South Bhutan (Chirang, Gaylegphug, Samchi, Samdrup Jonkhar)	13.2	35.3	13.8	11.3	0.8	74.4
Total	27.1	65.2	40.6	13.7	3.4	150.0
Percent of Total	18.0	43.5	27.1	9.1	2.3	100

Source: Department of Agriculture, Government of Bhutan.

*Source: Karan, Pradyumna P. 1987. Bhutan: Development amid environmental and cultural preservation. Tokyo: Tokyo University of Foreign Studies Press.*

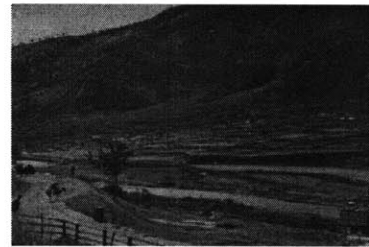
Dorji Wangchuk to conduct research on the environmental and cultural affects of development over a 25-year period. In 1967, Karan conducted initial research in the Kingdom. He returned in 1987 to document the changes in Bhutan's culture, natural landscape, and urban development. Much of the description of farming tradition and practices in this analysis is based on Karan's work.

### Geographic Conditions

Bhutan's natural landscape varies greatly throughout the country. The 46,500 sq km land area has distinct ecosystems ranging from the Himalayan Mountain Range in the north, to the subtropical valleys in the South.<sup>10</sup> Animal husbandry, forestry, and agriculture made up fifty percent of the nation's GDP and one quarter of the nation's export earnings in the late 1980s.<sup>11</sup> According to 1974-79 aerial surveys conducted by the Department of Forestry, crop land made up 2,492 square kilometers which was only 8.5% of the land surveyed and only 5.4% of total land area.<sup>12</sup> Most farmland has been located in river valleys and flourished from the ample streams leading into these rivers. The valleys within central Bhutan have the most fertile land for cultivation.<sup>13</sup> With deep, alluvial soil ideal for farming, these valleys are "characterized by small fields, the use of traditional implements, and an intensive subsistence-type rural economy in which rice and maize are the main crops."<sup>14</sup> Thimphu is nestled within one of these valleys. At its heart is the Wang Chu River that has supported life in the valley for centuries. Positioned at 2,350 m (7,700 ft.) above sea level, with slopes ranging from 5% to 25%<sup>15</sup>, the Thimphu valley is most suitable for cultivating rice and maize. Karan's field studies indicate that "bench terraces for cultivation should have a minimum soil depth of 60 cm and a slope of less than 33 percent."<sup>16</sup> Such land is primarily located in the valleys and therefore is an appropriate land use in the Thimphu valley.

### The History of Rice Cultivation

Because paddies require a constant water source, they are mostly irrigated or rain fed. A typical farm size ranged between 4 and 10 hectares of land. According to law, no one landowner could have more than 10 hectares. But the average farm was typically no more than one hectare. Although this small plot size is considered unproductive to upper management in the government today, it provided farmers with a livelihood and the country with significant produce. During the 1980s, Thimphu produced 4,000 metric tons of rice, which was comparable to that produced in other central valleys. It produced 7, 500 metric tons of maize, which was considered a much lower amount than that produced in Bhutan's other valleys.<sup>17</sup> Karan noted that more farmers were switching to oranges, apples, and other cash crops not typically native to Bhutan, because they could be sold at much higher prices.



*Thimphu valley just after the highway was constructed.*

*Source:* Karan, Pradyumna P. 1967. *Bhutan: A physical and cultural geography.* Lexington: University of Kentucky Press.



*Terraces during the winter months in Thimphu valley.*



*Terraces outside of Wangdue continue to be cultivated throughout the winter season.*

At the time of Karan's analysis, farmers continued traditional, pre-1900 farming techniques on their land.<sup>18</sup> Rice paddies have always been more popular than upland dry field farming where non-irrigated crops other than rice thrive. Yet the paddies are not the easier of the two to construct and maintain. Karan states, "The fact that paddy fields occupy a substantial portion of the cultivated land is all the more remarkable when one considers that paddy rice is more exacting in its climatic and topographic demands than are most upland dry crops."<sup>19</sup> The rice paddy's popularity is not due to an especially farmable environment. The construction and maintenance of the terraces is labor intensive. Because water must submerge the rice stalk as it grows, farmers need to physically form the sloped natural terrain into a flat surface for each rice paddy. The popularity of rice farming despite these hardships reflects the importance of rice to farmers. Whether it is more productive than dry farming or simply more essential to their livelihood and diet, rice farming is the preferred cultivation of farmers. It, aside from agriculture in general, is integral to Bhutanese culture and should be included in the nation's agenda toward sustaining a living cultural heritage. Currently, agriculture resides on the periphery or is excluded all together from discussions about cultural heritage and conservation.

Farmer's livelihood has been inextricably linked to their treatment of the land and Buddha's philosophy to respect all life forms shaped their approach. When the shift from the feudal trading system to a monetary economy occurred in 1907 with the inauguration of the Royal Government of Bhutan and the first king, agricultural techniques improved and production increased. Suddenly the farmers and the market economy benefited because the feudal landlords no longer had a monopoly on the land.<sup>20</sup> While this change may have improved the lands' economic productivity, more importantly it changed individual farmers' relationship with the land since they were now the direct beneficiaries of their labor and the quality of the land.

### **Challenges Facing Rice Cultivation**

Maintaining the productivity and viability of farming has long been a challenge. At the time of Karan's analysis of Bhutan's environmental and cultural preservation, he noted that the Fifth 5 year plan's goal to "achieve self-sufficiency in basic cereals was not realized." Therefore, he was determined to discuss the possibilities for maintaining Bhutan's cultivated land. Already in 1987, he recognized how unlikely it would be that more than 5.4% of total land area could be devoted to agricultural uses because of the "rugged terrain and severe climate."<sup>21</sup> He did see converting agricultural land into forestland, and vice versa as a possibility, depending on the environmental conditions on particular land where paddies could thrive and conversely, where soil threatened to erode. But such redistribution would not gain additional

agricultural land. Karan identified fallow land that remained in western and eastern Bhutan that could be cultivated if irrigation systems could be designed to reach them. Already steep hillsides and other inappropriate land was being used for agricultural purposes. Thus, in his conclusions, Karan recommended that the government introduce new, more efficient techniques to farmers in order to increase cultivation. His recommendations included:

1. The development of irrigation systems
2. The use of improved seeds
3. The application of manure and fertilizers
4. Proper crop rotation
5. The control of pests and plant disease
6. Improved agricultural practices gained through training<sup>22</sup>

At the time, training and research were already underway in parts of the country. These recommendations are worth noting because they attempted to keep agriculture a viable source of income for farmers and a substantive, self-sufficient revenue for the nation. Yet, they reflect the highly criticized Green Revolution during the 1970s and 80s. While they intended to increase agricultural outputs, they did so at a high cost in inputs (new seeds, fertilizers, pesticides, etc) which small farmers could not afford. This movement led to further impoverishing small farmers, enriching big farmers, and causing serious ecological problems because of the inappropriate application of “American style” “solutions” to food production needs. So, although it is not clear whether Karan’s suggestions were ideal or were followed, they did recognize the limited land use options Bhutan has for agricultural land and attempted to work around them. He did not view farming as a lost industry and source of livelihood, nor should the leadership in Bhutan today.

Unfortunately, as early as the late 1980s, little incentive remained for farmers to maintain their traditional livelihood cultivating the rice paddies. As a result of population growth and the relative decrease in the number of farmers, Bhutan was not producing enough crops to support demand.<sup>23</sup> Already 25,000 metric tons of food was imported from India. However, thirty years prior, Bhutan had been self-sufficient; the farmland yielded a surplus that was exported to Tibet. This difference in productivity could have been due to a rise in population growth, or because farming was still respected as an honorable trade and therefore families carried on the tradition. Regardless of the reason, relying on India for such a staple crop is not self sufficient and contradicts the national agenda of self sufficiency.

Bhutan’s upper management officials do not consider preserving agricultural land a priority or a possibility. Despite Karan’s

recommendations to increase productivity and self-sufficiency with the use of irrigated nurseries, improved threshing techniques and line sowing, priority was not placed on implementing such techniques.<sup>24</sup> Karan warned in 1987:

A land use inventory is tantamount to the solution of Bhutan's complex agro-economic problems. Precise data and maps concerning the proportion of Bhutan's land that is utilized for crops, the amount of land devoted to grazing and forests, and the exact extent of the waste and barren areas are lacking. If this essential information could be collected and mapped Bhutan's agricultural development planning would be greatly facilitated.<sup>25</sup>

Though this has now been done and detailed GIS maps document land use throughout the urban areas, the farmland is considered unproductive. Because housing is in such high demand and it is considered cheaper to build on flat land, the paddies have been identified as the ideal location for urban expansion. This belief has been aided by international consultants who have recommended that development occur primarily on the agricultural land. This not a sustainable or self-sufficient solution. Both the people and the environment have benefited from agricultural land. There are not enough jobs in Thimphu and the other urban centers to replace the farm trade, nor can the intricate ecosystem sustain development of an entire area.

## Summary

With the aid of Buddhist principles and Karan's agricultural analysis, this Chapter has shown why the preservation of agricultural land is critical. In the past, Karan worried about people migrating to the cities once the highlands had been deforested because they would "accelerate the destruction of the remaining lowland forests as settlers clear the land for farm use."<sup>26</sup> However, now in 2002, people are moving to the lowlands, not to continue farming, but to populate the urban centers that promise economic opportunities. The total land area of Bhutan's agricultural land has decreased, but agriculture still represents the majority of Bhutan's GDP (41%, including livestock enterprises) and it accounts for roughly 90% of employment.<sup>27</sup> In contrast, the nation has preserved more than its required 65% of forestland. Incrementally farmland in Thimphu and the countries' other townships, is disappearing to urban development. The rice paddies in particular must be treated as a priority, as forestland has, if Bhutan is to uphold its belief sustaining a living cultural heritage and environmentally sensitive development.

## End Notes

<sup>1</sup> Acharya, 35-36.

<sup>2</sup> NEC, Bhutan: The Path Towards Sustainable Development.

<sup>3</sup> NEC, The Biodiversity Action Plan, 19.

<sup>4</sup> NEC, Bhutan: The Path Towards Sustainable Development.

<sup>5</sup> NEC, The Biodiversity Action Plan, 19.

<sup>6</sup> NEC, Bhutan: The Path Towards Sustainable Development.

<sup>7</sup> Acharya, 35.

φ Despite this claim, there are others who challenge the rationale behind shutting down this plant. Apparently it was shut down because it was not benefiting particular politicians, in addition to the plant operators failing to sufficiently replant the forest areas.

<sup>8</sup> Karan, 1987, 89.

<sup>9</sup> Karan, 1987, 90.

<sup>10</sup> Karan, 1987, 71.

<sup>11</sup> Karan, 1987, 71.

<sup>12</sup> Karan, 1987, *Source: 1974-79 Aerial Survey, Department of Forests, Government of Bhutan, 72.*

<sup>13</sup> Karan, 1987, 74.

<sup>14</sup> Karan, 1987, 74.

<sup>15</sup> CCBA, Draft of Thimphu Structure Plan: Proposed Utilities and Infrastructure Plan, SWD-1.

<sup>16</sup> Karan, 1987, 146.

<sup>17</sup> Karan, 1987, 78.

<sup>18</sup> Karan, 1987, 89.

<sup>19</sup> Karan, 1987, 90.

<sup>20</sup> Karan, 1987, 90.

<sup>21</sup> Karan, 1987, 95.

<sup>22</sup> Karan, 1987, 95-96.

<sup>23</sup> Karan, 1987, 78.

<sup>24</sup> Karan, 1987, 79.

<sup>25</sup> Karan, 1987, 71,74.

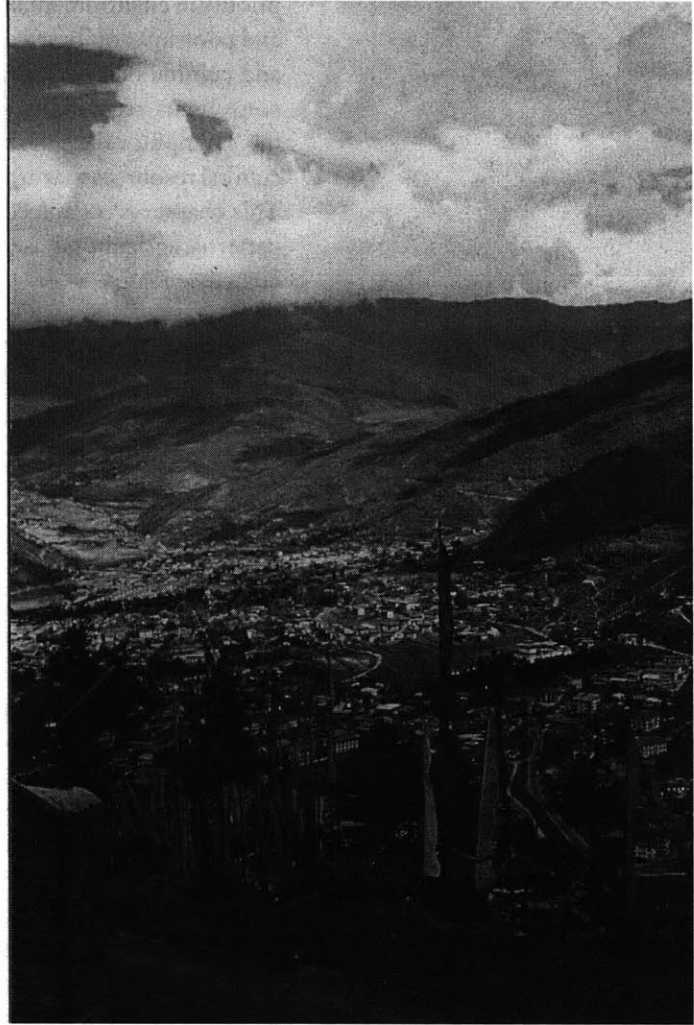
<sup>26</sup> Karan, 1987, 144.

<sup>27</sup> <http://www.riceweb.org/countries/bhutan.htm>



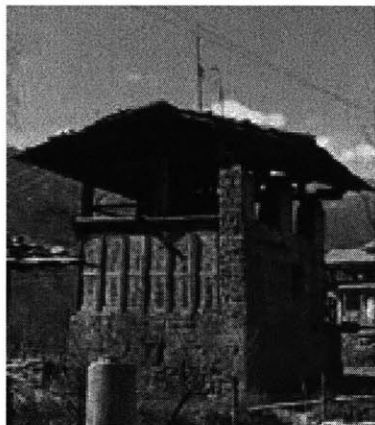
# Chapter Two:

*The Current Situation in  
Thimphu*





*These traditional farmhouses are constructed of rammed earth with timber substructure for the upper floors.*



Chapter One reviewed the significance of Bhutanese spiritual and cultural beliefs and how they have affected the Bhutanese relationship with the environment historically. It also hinted that not all of these progressive beliefs are given priority today. This chapter will describe the current pressures that are preventing Thimphu from adhering to these beliefs, and achieving the government's goal of cultural and environmental sustainability. Four primary conditions stand in the way. They include the current capacity of the government, the conflicting interests of the wealthy, the exclusion of agriculture as a priority in environmental conservation efforts, and the lack of cohesion and coordination between the environmental conservation, planning, and cultural heritage agendas. Though the government and its hired consultants are making progress in their efforts to plan and develop the Thimphu valley, the city is in risk of losing the environmental and cultural resources that are fundamental to maintaining Bhutan's identity. This chapter is organized into sections on the valley's current housing patterns, agricultural use, pressures in planning and development, and Structure Plan.

## Current Housing Patterns in the Valley

*"Modern housing developments look as though they are made for a place like Calcutta."*

### A young professional, Thimphu

Until recently, housing settlement patterns in the Thimphu valley have been organized around the rice paddies. Traditionally, homes have been clustered together either above or below the fields, saving the common, open space between them for shared footpaths and animal grazing. Almost all homes within the valley are equipped with electricity, although the older homes are often without running water. The farm homes have been constructed with sensitivity to the climate and site conditions. Responding to the landscape, the homes are staggered in plan and section to preserve access and views to surrounding the fields. Like a tree's structure demonstrates nature's hierarchy with a solid trunk for support, sturdy branches creating mass, and delicate twigs and leaves providing intricate detail, so does the traditional Bhutanese home. Its sturdy rammed earth walls rise up from the landscape, tapering like the natural forms around them. The upper floors are elaborately crafted of lightweight wood, and the roof's wood or slate panels are propped above an articulated cornice. The building footprint is relatively small, allowing the home to blend into the contours of the landscape.

Today, modern homes made of reinforced, concrete construction have begun to outnumber the old farmhouses. These houses are usually positioned closer to the roads and therefore, do not necessarily cluster

around the older settlements. These structures stand in contrast with the environment around them. Often constructed close to the river or streams, they threaten the sensitive riparian zones around bodies of water by increasing erosion and dumping waste directly into the water. The same building footprint and type of construction are used on slopes and flatland. They appear as rigid boxes around the valley, marked with some of the required traditional design elements, but standing in sharp contrast with their traditional forefathers. In some architects' observations, every time something new is built, the land is razed and retaining walls are built in place of the terraces, whereas the old structures were built around the landforms. Those interested in preserving the sustainable traditions have to be cunning to explain the benefits of sustainability in design, but some believe that convincing the decision-makers is still possible.

Bhutan's climate is not recognized in design of the modern buildings. Instead of using the traditional materials as cues for modern development, "there is a perception of old, traditional architecture as poor quality. It is associated with a bad social stigma."<sup>1</sup> Recently there has been attention on developing low cost housing using traditional materials.<sup>2</sup> However, this attempt may further promote the ideology that traditional materials are of lesser quality and hence, they are used for low-income housing. On the other hand, if the pilot projects are found to be attractive and less expensive, they may change the stigma attached to traditional materials.

Due to lack of coordination between the ministries, many of the rules and regulations that each department formulates cannot be fully utilized. The NCCA has developed rigorous design guidelines that aim to preserve the cultural identity of Bhutan's built environment, yet there is no discussion of site planning in response to traditional patterns. The buildings are considered valid as cultural expression, yet how they relate to the environment is not addressed. Meanwhile, the NEC, various departments within the Ministry of Agriculture, and the Royal Society for the Protection of Nature (RSPN) have dedicated money, time and energy to the formulation of regulations that will enable Bhutan to continue to benefit from environmental resources. Yet, their attention to and influence over urban areas is secondary. Thus, new development in Thimphu is not shaped by environmentally or culturally sensitive strategies.



*Quality materials of stone, slate, and brick (as shown above) are used less frequently than reinforced concrete.*



*New houses as shown in these images are most often painted reinforced concrete. When brick is used, it is usually covered from sight. Very few local traditional materials are used.*



## Current Relationship with Agricultural Land

*"We must look into the competitive advantage of agricultural land vs. housing and what benefits people more."*

**Tshering Dorji, Director General, DUDH**



*Thimphu's southern valley remains primarily farmland. This land, however, is now within the municipal boundary.*

Five years ago, the government policy prohibited development on the paddies. Yet today the pressures of urbanization are increasing and government officials feel they have no other option but to develop agricultural land and cannot stop private development from occurring on it. The Director General of DUDH speaks for the government when he says he believes in maintaining a balance between agriculture, traditional villages, and sustainability on one side, and urban development on the other. While various

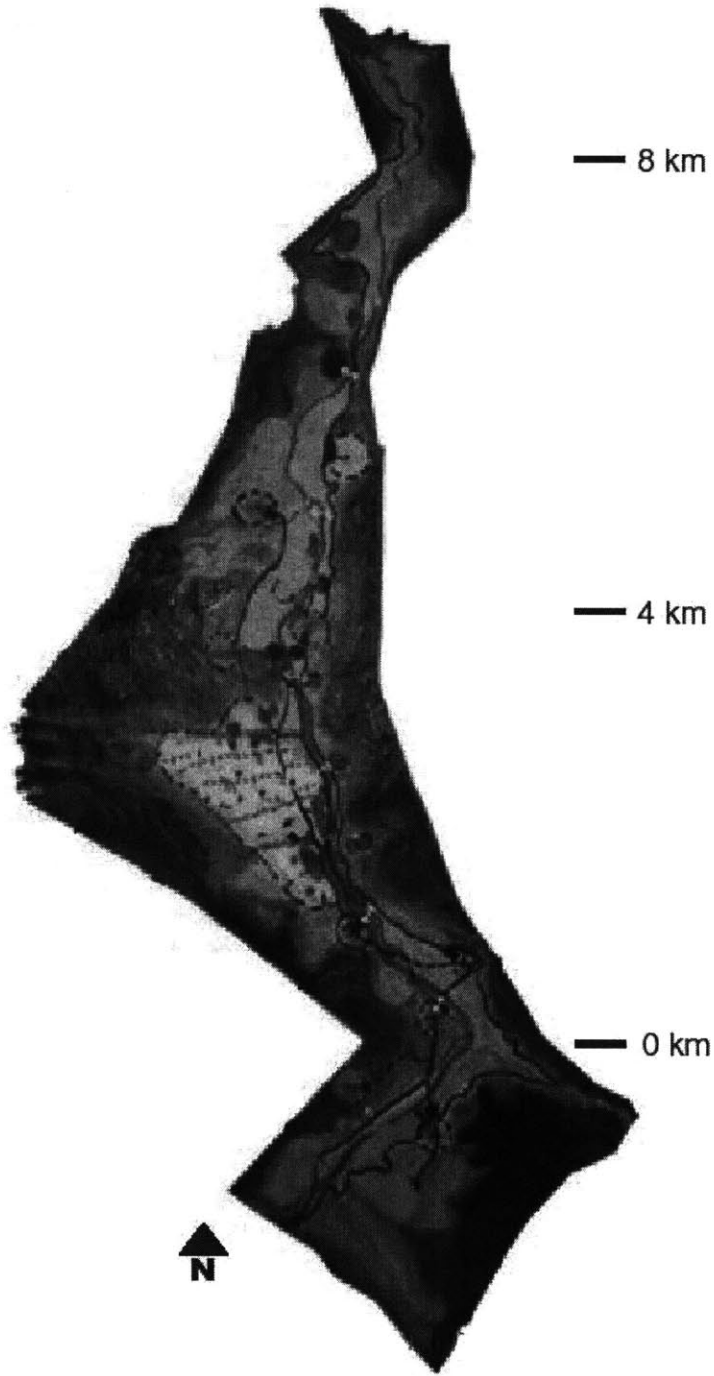
government departments have to come together to develop rules and regulations to achieve this balance, it has not yet been realized. For example, a committee was formed to address sustainable development, but found it difficult to organize and arrange the time to meet.<sup>3</sup> Without it placed as a priority on DUDH's development agenda, implementation will be impossible.

Despite this, DUDH has acknowledged that residents have spiritual attachment to their land and assign value to it even if agricultural use is less lucrative. Some landowners prefer to continue to farm the land, rather develop it with apartment buildings and become landlords. When the government extended the municipal boundary, some farmers were quite angry as they view farming as their only source of livelihood. Yet this sentiment is countered by intense pressure from housing needs and the construction industry.<sup>4</sup> Landowners must protect their own investments and feel threatened that government will soon buy their land at one-third of the price.<sup>5</sup> So they are selling it off now in order to maximize their land's economic value.

Agricultural land is not acknowledged in the current cultural heritage discussion. Dzongs and monasteries are considered part of the cultural landscape that is worth preserving, but the terraced land and the

farmhouses are excluded. Agricultural heritage is not recognized as part of Bhutan's cultural integrity. Though Sangyo Wangchuk, Secretary of the National Commission on Cultural Affairs acknowledges that old and new farming techniques could be blended so that indigenous and modern ways coincide, he does not see the new development in the valley as a threat to agriculture preservation overall. He believes that modern farming practices are better than the old. As the Secretary of the National Commission on Cultural Affairs, this statement is somewhat alarming. It echoes the commonly expressed sentiment that agricultural practice—the way of life and source of livelihood for generations of Bhutanese and their ancestors—is not recognized as an integral aspect of Bhutanese culture. But if the current trends persist and the farmland is taken over by development in the future, farming techniques will be irrelevant.

In addition, Bhutan's younger generation has little interest in farming. Seventy percent of children go to school and are less interested in returning to their families' farms when they finish. The young adult generation in general has a greater understanding of environmental sustainability and conservation, but they do not always understand the need to maintain the cultural landscape as a living tradition. It is now difficult and expensive to find agriculture



*This conceptual map of Thimphu's new municipal boundary illustrates the valley's current land use. The blue circles denote existing village settlements and the white area signifies the urban center. The shades of green represent forestland (shown darkest), orchards, and agricultural land (shown lightest).*

labor.<sup>6</sup> The farms are typically less than 5-acre parcels and government departments in charge of developing the valley do not consider them economical or productive. Thus, Bhutan imports tons of rice from India as it has been deemed cheaper to import items like rice and maize than grow them in Bhutan.<sup>7</sup> In response, the 9<sup>th</sup> Five Year Plan (which will go into effect in July 2002) has made agriculture part of its focus. In an attempt to bring facilities and amenities closer to the rural settlements so some of the population will remain where they are, the 9<sup>th</sup> plan proposes to improve farm roads in rural areas and to provide 15,000 additional households with access to electricity.<sup>8</sup> Planning Commission Secretary, Daw Tenzin doubts that these efforts can fight the decreased interest in farming. However, addressing the social stigma and lack of importance that is associated with farming could make moving to Thimphu less appealing.

## Current Pressures in Planning and Development

*“Culture is everything—not just what happened in the past, but what still goes on today. It can change. We must keep the old examples and symbols of our ancestors and add our new ones. We shouldn’t lose our identity and style.”*

**Sangyo Wangchuk, Secretary, NCCA**

Since 1952 when it was named the nation’s capital, Thimphu has developed from a small township surrounded by terraced rice paddies into a city of more than 50,000. Those who have witnessed its transformation, mourn the loss. Referring to the replacement of the original wooden bridge over the Wang Chu River with one made of concrete, Bhutanese historian Acharya states, “The price of modernisation has seen the construction of a nondescript concrete structure which would belong to any other city, but not to Thimphu.”<sup>9</sup> In 1999, Acharya describes the capital city as “essentially pastoral in character...” whose valley is beautifully terraced and whose foothills are dotted with fruit orchards and forest above.<sup>10</sup> This image of Thimphu will no longer be an accurate description if rapid development continues as it has in the past ten years. Concrete development, like this bridge, has emerged throughout the valley.

Thimphu continues to attract more people every day at a growth rate of seven to ten percent. The resulting housing crisis is acknowledged by community members, government officials, and private developers. Some community members and government employees doubt the validity of Thimphu’s projected growth rate, believing that it was a number exaggerated as a scare tactic by consultants. They believe that current planning efforts focused on the capital city are a start in the right direction. Others express concern about the rapid growth evident

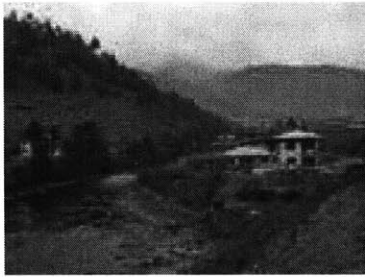
and the potential downturn of Thimphu. Comparing Thimphu to Bhutan's other densely developed city, Phuentsholing, there is a growing sentiment that Thimphu is quickly becoming its un-Bhutanese, overcrowded, and poorly planned neighbor to the south. There is much disagreement about the city's future: some believe that Thimphu is just beginning its evolution into a city, while many high officials consider it already ruined. The latter group compares it to Katmandu or other neighboring Indian cities and sees Thimphu's planning efforts as relatively progressive.

But Thimphu is losing the tradition and culture that once thrived in its built landscape. Unlike Bumthang, a town where some believe construction continues to reflect traditional form, in Thimphu there is a misinterpretation of traditional architecture. Traditional elements that once were integral to the building structure are now simply applied to the façade in attempt to maintain the appearance of tradition. There is the argument that it is more expensive to build using traditional materials. Karma Wangchuk, Bhutan's only urban designer, is most concerned with the misuse of proportion and dimension.<sup>11</sup> He does not want to turn the towns into monotonous interpretations of history. There is a certain hierarchy and status associated with Bhutanese buildings. If the government insists too much on standard traditional architecture guidelines, all the towns have the potential of looking alike. This is especially problematic for the living culture agenda if the diverse natural terrain that makes Bhutan unique is not recognized in new developments' architectural design and site planning. It limits the richness of the built form in years to come.

Because there is no official system to preserve cultural heritage, there is a growing opinion that "old is old" and no longer important or valuable, whereas anything new takes precedence. Therefore, new projects are becoming more modern, while the structural design and artistic nature of traditional buildings are being lost.<sup>12</sup> Even some old dzongs and temples have been demolished and rebuilt simply because the existing structure was not valued for its antiquity.

### **The Moratorium, Development and the Developer**

In September 2001, the Thimphu City Corporation (TCC) issued a moratorium, which prohibits residents from building on their land until formal plans are produced. TCC has promised landowners that the moratorium will be lifted in April 2002. It supposedly covers the entire municipal boundary, yet it is not strictly enforced.<sup>13</sup> Development continues for several reasons: the city government lacks the capacity to enforce the moratorium, the landowners feel pressure to build before their land loses value, and what the Bhutanese call "Kidu culture". Kidu culture is the notion that if an individual is well-connected or are able to convince high officials or His Majesty that the rules should



*These images demonstrate how new development is encroaching into sensitive riparian zones. Waste is deposited directly into the water. Construction threatens the sensitive banks, leading to erosion and runoff.*



not apply to them, they can get around them. Any rules and regulations can be bypassed when people go to a Minister, Lyonpo, or His Majesty to get approval.

Over the past three years, the career of “developer” has emerged for the first time. People enter the development world through a political game. The big landowners are often the politicians and the environmentalists so the agendas get mixed up and colluded.<sup>14</sup> Their public agenda is often contradicted in their practices. For example, private development funded by high-powered residents is beginning on steep forestland because of the views they offer and flat land is considered crowded. Consulting architect, Charles Benninger believes an approach to mitigate this would be to meet with powerful landowners and warn them of the consequences: the increase in waste, run off, and effects on the flora and fauna. Landowners could be reminded that the land belongs to the monarchy after all. It was given in trust by His Majesty, who is an environmentalist. Benninger believes people will respect His Majesty’s decision.<sup>15</sup>

However, this type of development is only one of three types of private development that currently affect the city’s growth. The following predominant categories of private developers are:

1. The large, wealthy developer who is money driven and has political power as noted above. He/she builds big, visible projects developments and tends to monitor the obvious regulations, but can get around requirements when they interfere with financial objectives.
2. The small, single or double homebuilder who usually already owns some land, but is interested in buying more. He/she builds gradually with unclear adherence to regulations and maintains low exposure.
3. The informal, very poor family who often builds around existing low-income areas, *bagos* (squatter settlements), and water sources. They have limited awareness of and capacity to adhere to regulations.

While, the type of development making the greatest impact on environment is not quantifiable in this analysis, the large development projects are the most obvious in their lack of environmental sensitivity. However, the second category of smaller development projects is the most difficult to control. There are more projects that fall into this category of development and the owners are informed and connected enough to know how to avoid the regulations. The informal settlements are currently ignored. But with the increased planning efforts, their position will likely become a problem. Because the inhabitants of the unplanned settlements are considered a lower class, they have limited rights and cannot protest the government’s plan for relocation. The cumulative effect of all three types of development will be harmful to

residents' quality of life and the environment if not guided properly.

The common sentiment expressed about the government's inability to stop landowners from developing may have grown out of the authoritative bodies' inability to enforce the strict legislative rules and regulations.<sup>16</sup> Landowners have already stated that they will start building in April even if the government is not finished with the plans and the moratorium remains.<sup>17</sup> The overwhelmed Department of Urban Development and Housing and the Thimphu City Corporation are left wondering how to encourage people to support the plans, rather than trying to beat them or get around them. The authorities' dilemma is how they can engage the community given their limited staff and capacity.<sup>18</sup>

### **Institutional Relations, Political Dynamics and Capacity**

The departments within each Ministry operate separately, yet Bhutanese culture is central to all of them. Urban development is in DUDH's domain unless they involve Dzongs or Monasteries, in which case the National Commission for Cultural Affairs (NCCA) is involved. Coordination can be difficult. Sometimes DUDH has too much independence as they plan and develop and NCCA feels they should be consulted. For example, a new bridge project has been approved. Yet, at the last stage prior to construction, NCCA was consulted about destroying the remaining section of the old bridge. NCCA did not grant approval and the new bridge had to be moved several meters over so that future generations "can view the old bridge and see the past."<sup>19</sup> Secretary Wangchuk does not blame the other institutions, but recognizes that in their day-to-day efforts, coordination and goals between the departments can be compromised.<sup>20</sup>

The Thrompen (Mayor) of Thimphu, believes this is a problem as well. He believes there is too little communication and coordination between the groups. The MoA, NEC, DUDH and TCC work separately from one another.<sup>21</sup> There are priority clashes. He believes the nation's self-sustainable goals could be realized if development was coordinated with the Ministry of Agriculture. The kingdom needs to focus on agriculture since such a small percentage of the country is farmable land and is usually located within the river valleys. But the question of what to sacrifice remains. Should construction occur on slopes to save the valley? Coordinating with NEC could inform TCC and DUDH how this could be done to limit the environmental impact. All of this coordination has to be done at the Minister level.

DUDH is not supposed to be the providers of housing in Thimphu. But they currently are because either private developers "have not shown interest" or have not been enabled. In the near future, DUDH hopes to be relieved of this weight and take the enabler role.<sup>22</sup> This would increase their capacity to plan for the nation's 54 townships. Of

these, 28 are small towns, and therefore are not high priorities. Each settlement needs a proper plan, but DUDH does not have enough staff to formulate them. There is tremendous pressure on DUDH to control development, but they cannot get the plans out fast enough.<sup>23</sup> Despite efforts to provide more housing, the Director General recognizes that there is not enough staff to maintain the existing government housing. Although the majority of trained development staff are engineers (rather than architects, landscape architects, or planners), there are no trained structural engineers in Bhutan. The Planning Commission is intent on finding ways to enable the private sector to partner with government development to help meet the demand for housing development.<sup>24</sup>

### Changes in Land Values

Since Thimphu's municipal boundary has been extended to include the surrounding valley, the previous development rules for rice paddies and wetlands no longer apply. Classified as urban land, landowners pay higher taxes, and thus are pressured to maximize on their land's financial value. Combined with a dwindling labor force and low return from rice production, to continue farming the land is the least financially rewarding use for the land.<sup>25</sup> However, landowners are not required to pay urban taxes until they receive urban infrastructure services. If their farmland does not already benefit from such services and they continue to practice agriculture, they will not be taxed as urban land.<sup>26</sup>

There is much discussion about how to address landowners' limited ability to maximize their lands' value, but preserving agricultural land is not a consideration. The issue that dominates these discussions is compensation. How can individuals be compensated adequately for their land given the limited government resources? Land pooling is being discussed as a possible means for redistribution of land. But the government has little experience with it and thus is moving cautiously.<sup>27</sup> In the future, however, some planners believe that land pooling can help residents benefit from development because it gives the landowners the opportunity to become active in the development process. The outdated, harmful practice of displacing residents is too expensive for the government to rely on acquiring the land. Also, land pooling may make landowners less anxious to build, thereby reducing haphazard development.

There is a historical system of rural subsidy. Timber, stone, and other building materials are sold to rural residents at half price so their livelihood can be sustained and improved. Yet, wealthy speculators have been able to work the system by buying cheaper land just outside of the municipal boundary and have benefited from the subsidies, urban infrastructure and services. In these urban ring areas, landowners are not usually required to submit drawings for housing development—and if they do, they are not scrutinized. Yet this housing is so close to

the city that they charge an urban rate for rent. These speculators are one step ahead of planning—they benefit from future planning efforts when the new roads and services reach them just years after construction.<sup>28</sup> This technique ends up harming the adjacent farmers because as development sprawls outward, the rural lands' boundaries continue to diminish.

### Slope vs. Flatland Construction

The lack of available land for housing development poses a serious problem for those without land. Part of the shortage of buildable land could be avoided with slope construction. This possibility is not taking precedence, but developers and planners are discussing its potential and private landowners are putting it to the test. There is strong interest to do this within municipal boundaries. Because municipal land has higher taxes landowners are eager to utilize all the land they own. Already, there is more housing development on the hillsides. If it continues to be under-regulated, it will lead to larger problems of erosion and landslides. Analysis is needed to determine how slope construction will affect the environment. Because Thimphu sits within a seismic zone, appropriate slope construction and the degree of slope that is considered safe must be reviewed cautiously.

However, if too much slope construction occurs on what was previously recognized as forestland, it may present a conflict with the environmental mandate to keep 60% of the land as forest. The current draft of *Development Control Regulations* identifies the appropriate ground coverage ratio for sloped land.<sup>29</sup> As the site's slope increases from 11% upward to 60%, the allowed ground coverage ranges from 45% to 5%. Construction on a slope of 60% or higher is not allowed. The NEC has authority to give clearance to any construction on slopes higher than 30%. Charles Benninger, head architect of Christopher Charles Benninger Architects, believes there is dire need to educate people about the importance of forest cover, not because it is pretty, but because destroying it leads to erosion and siltation.<sup>30</sup> For example, the river, once the valley's sole source of life, has been affected by erosion and sedimentation, and now threatens to flood the flat land on either side of its path. Already the city of Paro, which sits downstream from Thimphu, has "some 150 ha of prime agricultural land under constant threat of river bank erosion during the monsoon season."<sup>31</sup> This risk only increases as Thimphu continues to develop. Development creates more impervious surfaces and causes delicate topsoil to erode, thereby preventing the gradual absorption of runoff



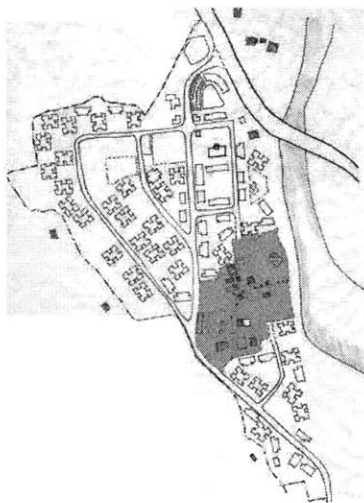
*This image shows homes outside of the urban center constructed in an unplanned manner. Slope construction dots the hillsides throughout the valley.*

*The Wang Chu River winds through the valley toward Paro.*





*The partially completed public housing site is the largest ever constructed in the valley.*



*The Changjiji Site Plan*

*Source: DUDH; sketch by Rachel Loeb*

and filling water tributaries and the river with sedimentation.

## **New Development Trends in the Physical Plans for the Valley**

*"If we cannot appreciate the terrain we are finished."*

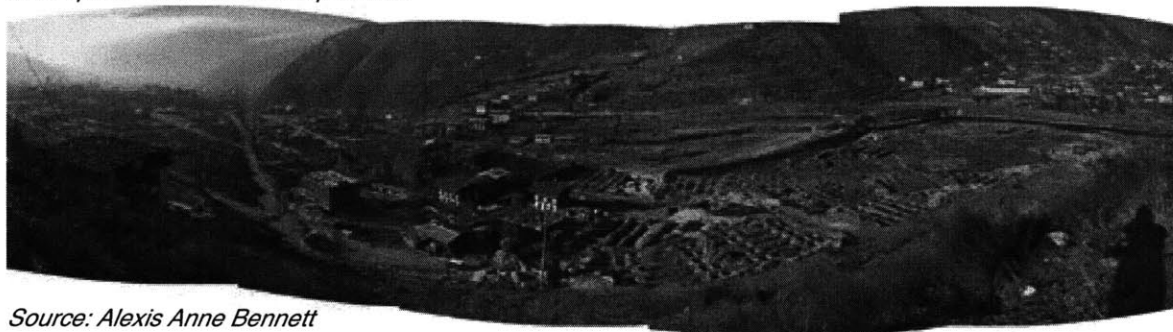
**Karma Yezer, Superintending Engineer, DUDH**

### **Changjiji**

DUDH's latest large-scale public housing project in Changjiji exemplifies the current situation and pressures in Thimphu. Although it was only a third complete at the time of the field study, the 73 building development had satisfied no one. Changjiji is an example of the risk of designing buildings before a site is chosen. It cannot be the nation's model to follow for sustainable development. Along with the complaints about Changjiji regarding time constraints and untimely leadership interference, the development's design, construction techniques, land acquisition process, and lack of attention to the natural site conditions are most problematic.

Perhaps most important about the development in Changjiji is what existed there before—terraced rice paddies, farmhouses and their residents. The terraces have been razed and the residents have been mute. What used to be incrementally sloping terraces are now broad, flat steps with 15 to 20 foot drops in elevation. None of the vegetation, terrace walls, or natural contour lines were saved or used to guide the site design. Similarly, the farmers who cultivated the previous landscape were not active partners in the development. The government compensated the landowners for the farmland with the government's rate for agricultural land. The landowners were left with the land that surrounds their traditional farmhouses. DUDH chose to classify this area as a heritage site, yet the landowners want to be able to build on the little land they have left. Without their traditional source of livelihood, the landowners consider building apartment buildings and renting them out as their only source of income. They are surrounded

*Overlooking the site from the highway shows the new construction's massive scale in contrast to surrounding development and settlement patterns.*

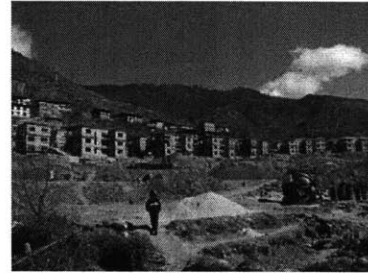


*Source: Alexis Anne Bennett*

by new concrete and brick housing development, and yet they are told they cannot construct on the only land they have left. They feel as though they are “being burnt twice” by the government.<sup>32</sup> Middle management officials recognize if this continues to be a trend, all the traditional villages and rice paddies will be lost.

While the design of the buildings adhered to the Traditional Architecture Guidelines, there are no traditional guidelines for site design and planning. Traditional settlement patterns reflect a greater sensitivity to their natural environment that should be carried out in modern development. Although Changjiji adhered to the Development Control Regulations developed by the Planning Division of DUDH, neither middle nor upper management is pleased with the outcome. But despite the disappointment in Changjiji, the blame cannot be placed entirely on the designers and engineers. The existing areas of importance on the site, such as the prayer flag mounds, were meant to be incorporated into the final design, but were removed due to conflicting priorities or miscommunication. Also, considerable attention was paid to the natural site conditions in the original site design. Initially, footpaths, which led from the units to the commercial area, the community center, public transportation and the riverside walkway, were planned to connect the residents with site facilities, cultural landmarks and nature.<sup>33</sup>

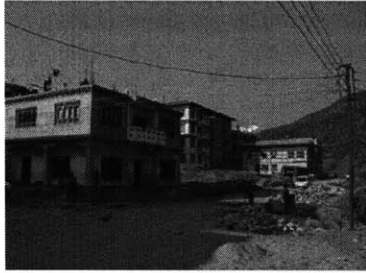
Originally Changjiji was supposed to use low cost building types with simple, cost-effective design.<sup>34</sup> The complex was initially designed to serve lower income needs and thus was designed with a large number of one-bedroom apartments. The units were designed simply to keep the costs down. When the design went up for approval by the Cabinet of the Council of Ministers (CCM), it was considered a “matchbox” look. The CCM wanted something more unique that was not a simple square or rectangle. The changes that were made by the CCM were mainly regarding the room size within the units. Their argument was legitimate. Bhutan is not made up of nuclear families; often multiple families share the same home. Therefore, the units need to be larger with multiple bedrooms.<sup>35</sup> Yet the changes necessary to accommodate these requests transformed the buildings into big housing blocks that are too broad and inappropriate for the slope of the site. For example, attention to sun orientation was neglected resulting in two units per floor without sun.<sup>36</sup> Future development should use split-level designs which respond to the landscape and allow for maximum natural light, ventilation, and views.<sup>37</sup> Although some engineers believe there is a trend with new development to conform to the topography, Changjiji contradicts this. As does the other DUDH development throughout the country. Rather than reinforcing the terraced environment, it obliterates it, which can result in future problems with erosion, drainage and runoff, and quality of life for residents.



*The site was previously rice terraces (shown razed in the foreground). The new three storey apartment buildings are sited below recent privately constructed homes.*



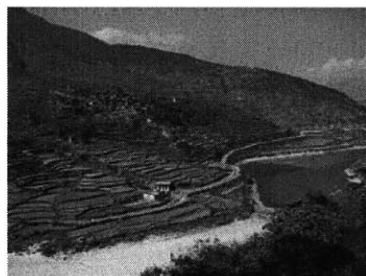
*The traditional rammed earth farmhouse in the foreground is surrounded by the new reinforced concrete structures.*



*New Punakha in contrast to a nearby traditional settlement (shown below).*



*Source (of all Punakha photos): Rachel Loeb*



*Wangdue's rice terraces make efficient use of the sloping valley and the proximity to the river.*

## Other Town Plans

Although they are outside of the study area of Thimphu valley, the following plans are important to this analysis as they demonstrate the current direction of urban planning away from traditional site planning and the current lack of respect for agricultural land. The government has acquired land for the development of permanent townships in Punakha and Wangdue. The original townships, like most settlements in Bhutan, were developed in ribbons along the highways and were constructed as housing settlements for workers. They were not intended to be permanent. Thus, the government is in the process of planning “proper” new town centers.

### *New Punakha*

The first project took place in Punakha where the new town was constructed on land far from the old center. Yet, like most existing towns, Punakha flourished for many reasons including its proximity to transportation routes and services. The new urban center in Punakha has been moved 5 km south of the old town. Young professionals consider the new location inappropriate; it is not on the crossroads and its position feels artificial and forced. In attempt to relieve congestion in Punakha, the government decided to plan a new mixed-use urban center. A five block flat grid of concrete was imposed on the rice paddies. Three and four storey concrete apartment buildings with commercial storefronts appear as foreign objects amidst the dusty remains of the farmland. In one architect's opinion, it feels rigid, crowded, not like Bhutan, more like India. The design is based on urban planning techniques that forget the human factor. It does not consider how people live in the valley and villages. Because Punakha is not highly populated, some critics do not understand the need for such density and height. In the old town, the commercial area was comprised of shacks and traditional buildings, but it had character. The new development does not. What new Punakha demonstrates is the responsible authorities' view of what is valuable. The value of the terraced landscape is completely ignored in this settlement. The specific natural conditions that once made the site unique are razed and flattened. The separation of this new development marks a severance of ties from the culture and social network in old Punakha.

### *Wangdue*

East of Punakha, the town of Wangdue awaits its new plan. The location of the new township has been moved 500 meters away from the existing town center so everything will still be in walking distance. But it is located on prime terraced agricultural land. Foreign consultants have encouraged the government to develop this relatively flat land because it is cheaper. The land is outside of the current flood plain, if development continues it will increase the flow of runoff, which will

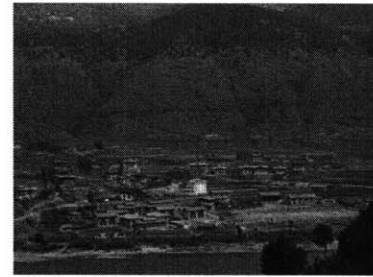
erode the river basin over time, increase the river flow, and thus widen the flood plain. Although there has been internal discussion about the possibilities of slope construction in Wangdue, it goes against the recommendations of the consultants. Because the consultants are expensive, the government follows their reports and recommendations, despite the social costs they sometimes incur. In the case of development of agricultural land there is significant social cost to the communities living and farming in these areas. Families are displaced and the monetary compensation does not last the way land would.

## The Current Drafts of the Concept and Structure Plans <sup>38</sup>

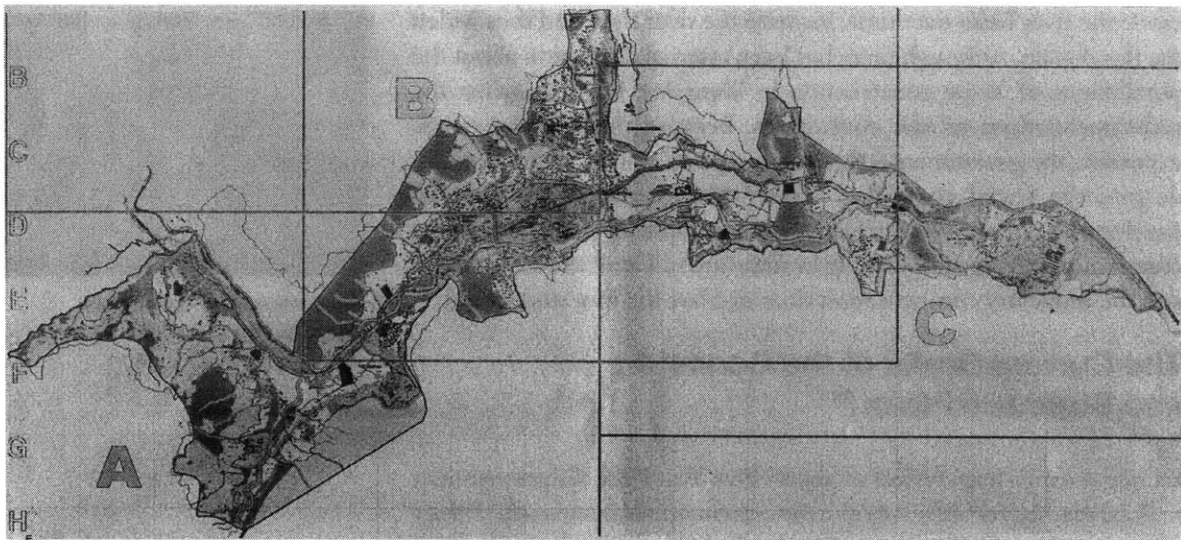
During the mid-term review of the 8<sup>th</sup> Five Year Plan, the government realized that they could not ignore the current urbanization rates. Upper management and young professionals believe construction and development controls and regulations were strict, yet they lacked a planning vision. Subsequently, in May 2001 the Christopher Charles Benninger Architects Planning and Architecture firm (CCBA) based in Puna, India was hired by the Ministry of Communications to prepare a Concept Plan, Structure Plan, and Local Area Plans for the city of Thimphu. CCBA has aimed to include conservation and environmental sensitivity in all of their plans.<sup>39</sup> Despite housing and development pressures, the structure plan has allocated a large percentage of land in the valley to fall under one of four Environmental Zones because of the valley's fragile characteristics. Head consultant, Charles Benninger believes if Thimphu is to salvage any of the environment, it can withstand a 100,000 maximum population within the current urban boundary.<sup>40</sup> To support the natural environment, CCBA has proposed an open space system connecting the Dzong's preserved area to other open space throughout the valley. A bicycle path around the valley and footpath that identifies the end of the city limits will link this open space system, providing views of the prayer flag mounds, monasteries, and other heritage structures throughout the valley.<sup>41</sup>

### Environmentally Sensitive Zones

Within the Structure Plan, zones E-1—E-4 are dedicated to environmental use. The E-1 zone denotes forestland that now is in the urban boundary, and thus has lost its protection from the forestry department. Because CCBA does not believe the Forest and Nature Conservation Act of 1995 is enforced, they created this zone to protect forestland. However, the plan has significantly reduced the environmental development regulations that the Forest Act required. For example, the E-2 zone is classified as ecologically fragile areas and riparian zones along tributaries. To protect these riparian zones, the E-2 zone prohibits removal of trees and vegetation within 30 meters



*These terraces have been identified for the urban center development*



*The Current Draft of the Structure Plan*

*Source: CCBA, Inc.*

on either side of the river and major streams, and 15 meters on either side of small streams and rivulets. The previous Act, required a buffer zone of 100 meters. This decrease in buffer zone may be viewed acceptable by the consultants, but it may be ineffective in serving its purpose to protect the water from erosion and sedimentation and to preserve the fragile soil and ecosystem along the bodies of water.

The plan has numerous progressive recommendations that can help an urban Thimphu maintain some of its natural qualities. For example, some riparian zones are classified as G-2, which allows other recreational uses like community parks to be sited along waterfronts that are less ecologically sensitive. Purification ponds that use aquatic plants to filter out pollutants in runoff will be designed within recreation parks, so they can serve dual purpose of environmental remediation and recreational use.<sup>42</sup> Minor development can occur in the G-2 zone unlike in other riparian zones. All riparian zones will have footpaths to encourage pedestrian activity. Meanwhile, CCBA is conducting studies for indigenous plants and revegetation to protect these areas from erosion. Infrastructure systems will not be allowed in the riparian zones as they currently are, which can significantly improve water quality throughout the valley.

The E-3 zone is primarily reserved for rice paddies and agricultural use with farmhouses allowed at a ratio of one house per acre. There are only two areas classified as such. Babesa, home to rice paddies and a migratory bird habitat, is one of them and has been identified as the city's southern gateway. The E-3 classification will protect the habitat from development. CCBA plans to retain the old structures in this area. Flanked by the natural habitat, the settlement will show off the region's cultural and natural heritage. The other area defined as E-3 currently consists of rice paddies near Hejo. Because this is the flattest

land, there is pressure to develop it as housing. CCBA has suggested shifting the development zone up the slope, away from the paddies.<sup>43</sup> But as is the case elsewhere, conserving this land will require the government to purchase the land so owners are not prevented from developing without adequate compensation.

The E-4 zone signifies steep hillsides with slopes above 30° outside of areas already protected as forestland. Most of the valley falls into this category. While some of this land is already used as orchard land, forestry is ideal in this zone. The allowed density here is 1 farmhouse per acre as allowed in zone E-3. CCBA feels current development trends are trying to push the limits of appropriate slope construction. Benninger warns that as the slope increases, paved areas must decrease and stilt construction must be utilized to preserve the biomass beneath.<sup>44</sup>

### **Culturally Sensitive Nodes**

CCBA has identified thirteen areas throughout the valley that will be developed into urban villages with high-density neighborhood nodes, comprised of two to three story walkups. Surrounding these high density nodes will be a medium density zone; within a 200 meter perimeter will be a lower density zone made up of single family homes. Each node will have a clinic, garden, and community center.<sup>45</sup> In response to the loud debate regarding what to do with the traditional villages throughout the valley, CCBA has suggested maintaining heritage precincts with a buffer zone of landscaping to protect them and integrate them into the open space system.<sup>46</sup> This is an essential connection as it includes the natural and agricultural landscape in cultural heritage. The thirteen nodes must respond to the traditional villages and the rice paddies. They can benefit substantially if the traditional village and the agricultural land patterns around them are incorporated into the open space system. New development should reinforce culturally rich villages and maintain a relationship with the agricultural land that created their existence. Development in areas adjacent to the village centers will be dense to allow the open agricultural land in areas outside the periphery of the village centers to be preserved.

### **Government Response**

Most of CCBA's intentions sound ideal. They aim to create a series of pedestrian friendly urban communities with substantial attention to preserving open space and agricultural land and developing with environmental sensitivity. Yet government officials and private developers doubt how realistic such a plan is. Implementation of the Structure Plan requires money. A huge financial investment is needed. And yet with the intense development pressure Thimphu faces, the government will not have sufficient funds to implement the plan all at once. Infrastructure development will have to be phased over time.

The Director General believes DUDH may have to demarcate new plots so landowners can start construction and not wait for the formal plans to be fully implemented.<sup>47</sup> In addition, to successfully implement the structure plan, Benninger believes the Commission of the Council of Ministers will need to oversee planning, design, and implementation and take away the load from TCC.<sup>48</sup> Such a centralized process will inevitably take more time to complete.

Some middle management officials felt distanced from the planning process and consider CCBA to be operating independently from DUDH. There is the impression that CCBA has not addressed a crucial issue: how the government can afford to conserve the land and compensate the landowners. There is a common sentiment that foreign consultants have been paid considerably high fees to create a structure plan that is just an idealistic vision. It is believed to lack design specifics that lead to effective implementation. Nothing has been produced to show the character of the new urban centers and therefore, some Bhutanese officials are not convinced that the plan will not just sit on the shelf.

Last, the plan does not address how modern planning efforts can learn from the traditional Bhutanese settlement patterns. Although it has an environmental focus, sensitive construction that can prevent runoff, erosion, and flooding is not addressed in detail. Without serious attention to them, the tradition and culture once celebrated in the valley may be lost.

## Summary

Bhutan is not unique in its struggles to balance development pressures with its cultural and environmental goals. However, unlike many countries, Bhutan still has the power to choose which path to take. If the government chooses to realize and enforce their intentions to maintain their cultural heritage and Buddhist traditions, they may be able to meet the housing needs, as well as preserve the cultural and environmental integrity of the valley. But current trends do not demonstrate this. This chapter has shown how the current conflicts in the Ministries agendas, staff capacity, and the type of value placed on agricultural land are affecting development trends and threaten to erode the valley of its resources. The following chapter will describe how these trends have fallen short of implementation of the well articulated environmental and development regulations and have prevented the government from reaching its goals toward sustaining Bhutan's unique environment and culture.

## End Notes

- 1 Wangchuk, DUDH
- 2 Tshering Dorji, DUDH
- 3 Tshering Dorji, DUDH
- 4 Tshering Dorji, DUDH
- 5 Tshering Dorji, DUDH
- 6 Tshering Dorji, DUDH
- 7 Tshering Dorji, DUDH
- 8 Rapden and Phuntsho, CBS
- 9 Acharya, 55.
- 10 Acharya, 55.
- 11 Wangchuk, DUDH
- 12 Wangchuk, NCCA
- 13 Yezer, DUDH
- 14 Benninger, CCBA
- 15 Benninger, CCBA
- 16 Wangchuk, NCCA
- 17 Yezer, DUDH
- 18 Yezer, DUDH
- 19 Sangyo Wangchuk, NCCA
- 20 Sangyo Wangchuk, NCCA
- 21 Phuntsho Wangdi, TCC
- 22 Tshering Dorji, DUDH
- 23 Tshering Dorji, DUDH
- 24 Tenzin, PC
- 25 Tshering Dorji, DUDH
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- 27 Yezer, DUDH
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- 29 CCBA, *"Draft Development Control Regulations,"* 2002
- 30 Benninger, CCBA
- 31 Ministry of Agriculture, *Assessment of the current state of agriculture and forestry,* 55.
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- 37 Price, DUDH
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- 39 Benninger, CCBA
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- 42 Staff, CCBA
- 43 Staff, CCBA
- 44 Benninger, CCBA
- 45 Benninger, CCBA
- 46 Staff, CCBA
- 47 Tshering Dorji, DUDH
- 48 Benninger, CCBA



# **Chapter Three:**

*Existing Environmental  
Protection and Development  
Regulations*

*“Build on traditional knowledge to improve the sustainable benefits local people obtain from biodiversity.”*

**C. Dorji, Planning Commission Minister**

The cultural and historical relationship that the Bhutanese have cultivated over the years has significantly influenced their regulations. This chapter reviews the Middle Path development strategy, along with countless other progressive environmental legislation, that have attested to upholding the cultural and environmental values which the country holds dear. While the magnitude and content of the Royal Government’s plans and acts are commendable, the lack of enforcement, coordination, and integration of environmentally sustainable strategies that prioritize the preservation of rice paddies in urban planning is limiting their ability to improve Thimphu’s development. The following sections describe the country’s vast array of legislation and discuss how it can be better used and coordinated to resolve that which threatens Bhutan’s rice paddies and natural landscape most—urban development.

### **Bhutan’s “Middle Path” Development Strategy**

Since 1974, when the NEC produced the *Notification on Reserve Forests and Wildlife Sanctuaries* to preserve 4200 sq km of wilderness as a nature reserve, the Royal Government has taken active steps towards maintaining the country’s biodiversity.<sup>1</sup> Thereafter, legislation and projects aimed to protect the environment through sustainable development practices were initiated. Most recently, the government has made a commitment to uphold the country’s environmental and cultural resources by following a “middle path” development strategy.<sup>2</sup> The NEC defines this strategy as “...development that recognizes the need to raise the living standards of the present population without compromising the country’s cultural integrity, historical heritage or the quality of life for future generations.”<sup>3</sup> In keeping with the emphasis placed on maintaining high Gross National Happiness(GNH), the middle path of development is “not driven by the lure of capital nor by political opportunism.”<sup>4</sup> Rather GNH is governed by four goals including economic self-reliance, environmental preservation, cultural promotion and good governance.<sup>5</sup> Unlike other countries, which base so much of their development agendas on their Gross National Product, the Royal Government of Bhutan claims to use non-monetary measurements to shape their plans for development. The Chairman of the Council of Ministers acknowledges how the non-monetary GNH goals affect development:

The cost of maintaining culture and environment often makes development projects more expensive in the short run but pays in the long term.<sup>6</sup>

These goals challenge the country to balance its environment and development agendas. Although this is difficult to realize, the current development policies “disregard sacrificing its natural resource base for short term economic gains...”<sup>7</sup> Yet, “in setting out to build a post-modern, post-industrial, environment-friendly society, emphasis is placed on achieving self-reliance based on agricultural and forestry practices and tapping the considerable resources of timber, minerals and hydroelectric power.”<sup>8</sup> This agenda presents a precarious balance: how to utilize the country’s natural resources without exploiting them, and thereby degrading both the resources and the culture that grew out of them.

The World Wildlife Fund (WWF) recognizes Bhutan’s middle path strategy as a model for development committed to preservation of biodiversity and the environment. They consider the path significant because the government’s approach to environmental conservation “is not treated as a sector but rather as a set of concerns that must be mainstreamed in Bhutan’s overall approach to development planning and to be buttressed by the force of the law.”<sup>9</sup> While in theory this may be true, in the reality of today’s urban development, environmental conservation is not taking center stage. Nonetheless, Bhutan’s approach is progressive especially “in the South Asian context where environmental degradation has been widespread and conservation of natural resources has been put on the back-burner of political agendas.”<sup>10</sup>

While most environmental attention has been focused on preserving Bhutan’s rich biodiversity of flora and fauna, the NEC has acknowledged the value in preserving the biodiversity of agriculture as well. The traditional farming practices, including multiple cropping and maintaining variety in plant species, are recognized as organic and ecologically sound practices.<sup>11</sup> “For instance, rice is not just food for people; its straw provides food for animals and the soil.”<sup>12</sup> The fields are often inter-cropped which allows farmers to diversify their produce and economic yields while providing the soil with nutrients. Thus, the attention to the National Biodiversity Conservation Strategy echoes the “Buddhist tenet that the acts of this life will be rewarded or punished in the next...” and brings Buddhist philosophy into the current national agenda on environmental conservation.<sup>13</sup> Unfortunately, agricultural land’s environmental value is not widely recognized by the other ministries and little is being done to save it within the rich, fertile valleys that are urbanizing. conserving agriculture land is not included as one of DUDH’s priorities as it struggles to provide quality housing for Thimphu’s residents.

## Existing Environmental Protection Acts

To further illustrate the Royal Government’s intent to sustain the nation’s natural resources, a number of acts and plans are reviewed in depth in this section. The following analysis provides examples of legislation which *if* directly applied to farmland, effectively coordinated between departments and enforced could make the country’s sustainable development plan comprehensive. This section will show that while the environmental legislation focuses on the preservation of forestland and biodiversity, the integration of agricultural, cultural, and physical planning regulations could further strengthen kingdom’s goals towards sustainable development. In addition, it reveals how the country’s urban development control regulations are far removed from the environmentally sensitive agendas expressed in NEC’s acts.

### Forest and Nature Conservation Act of Bhutan, 1995

Under the Forest and Nature Conservation Act, the Royal Government has the right to declare any private land to be Government Reserved Forest if they deem it necessary to “protect public health and safety, to prevent land slides on highways, to maintain critical watersheds, to conserve wild animals and plants, to preserve scenic areas and for related purposes.”<sup>14</sup> Such legislation is applicable to the preservation of rice paddies to secure their place in Bhutan for future generations, yet it is not used for that purpose. It is important to note that the first of ten Prohibited Acts in Government Reserved Forests is “clearing or breaking up any land for cultivation or any other purpose”.<sup>15</sup> The priority placed on this act is now outdated. Forestland is not in as much threat from farmers wanting to increase their farmland, as it is in threat from developers and speculators wanting to construct new homes. Similar regulations that recognize the need to protect the country’s scarce amount of agricultural land are necessary.

Within this act, riparian zones and other sensitive areas were protected under a section stating that “no permit shall be issued under this chapter to fell and take any timber:

- Within 600 feet uphill or 300 feet downhill of a motorable road except forest roads;
- Within 100 feet of the bank or edge of any river, stream, water course, or water source, or;
- On any place where the slope is greater than 45 degrees unless authorised under an approved management plan or by the head of the Department.<sup>16</sup>

Such regulation demonstrates the government’s progressive approach

to land and natural resource management. Upholding such explicit regulations will prevent erosion, sedimentation and pollution that is associated with development. Thimphu's Structure Plan, as described in detail in Chapter Two of the thesis, has reduced the buffer zone along the river and other major streams to 30 meters or less, depending on the body of water.

Chapter VIII in the Act is also concerned with soil and water conservation matters. It describes the Ministry's authority over private land to prevent "breaking or clearing of land," and to protect soil and water qualities.<sup>17</sup> Chapter IX further stresses enforcement of the rules and regulations and the penalties individuals will face if they fail to comply. It describes in detail what powers forest officers have, the repercussions of obstructing justice including subsequent offences, confiscation, cancellation or suspension of permits, and eviction.<sup>18</sup> It is unclear if the penalties are enforced, however.

The act also recognizes the importance of partnerships in implementing its numerous regulations. Section 15, titled Forestry Leases, states "The Head of the Ministry [of Agriculture] or his authorised representative may lease Government Reserved Forest to any person for improvement, protection and sustainable use in accordance with the applicable management plan."<sup>19</sup> Such a policy can be extremely beneficial if applied to the preservation of agricultural land because it takes the pressure off of the Ministry of Agriculture to be the sole regulating and implementing body in preserving agricultural land.

The act devotes an entire chapter to Social Forestry and Community Forestry in which the allowable uses of social and community forestry are addressed. One particular item that should be transferred to the protection of agricultural land contends: "The Ministry [of Agriculture] may issue Social Forestry Rules to encourage any person to grow or nurture forest crops on his own registered private land."<sup>20</sup> Similarly, the section dedicated to Community Forests can also be applied to community farms. It states:

- The rules for community forests may provide for the transfer of ownership of the forest produce in the community forest to appropriate groups of inhabitants of communities adjoining the forest.
- The group to which community forests have been transferred shall manage them for sustainable use in accordance with the rules for community forests and the approved management plan.<sup>21</sup>

These regulations have strict consequences if they are not followed. They articulate the first steps needed to make community forestry

and tree harvesting viable, yet the tone seems to discourage community efforts as they state the risks more than the benefits. With the increased density of development in Thimphu, community farmland makes sense. Shared land and labor can allow crop production to continue and help increase levels of self-sufficiency, while retaining the value of the traditional livelihood.

Chapter VI is dedicated to the establishment of additional Protected Areas. The terminology in this section can be transferred directly to a protected agricultural zone. It states:

The Royal Government may declare any land in the country to be a National Park, Wildlife Sanctuary, Wildlife Reserve, Nature Reserve, Strict Nature Reserve, Protected Forest, Research Forest, Conservation Area, Cultural or Natural Heritage Site, Biosphere Reserve, Critical Watershed or other category of Protected Area for the preservation of areas of natural beauty of national importance, protection of biological diversity, management of wildlife, conservation of soil and water and related purposes. If any private registered land is taken under this section, compensation or alternative land rights shall be provided in accordance with Section 9.<sup>22</sup>

As in Chapter IV, this section also explicitly states the consequences of failing to comply with the rules stated above. In this case the punishment is increased to five months of imprisonment. While the level of detail in the Act is significant, it is unclear if the government is enforcing it in the country's rapidly developing areas. Because land that is incorporated within the municipal boundary is not protected by these acts, there is considerable risk that the urban centers will develop in complete contrast to the agendas expressed in this and following acts. The legislation should be applied to urban land and farmland preservation.

### **Biodiversity Action Plan for Bhutan, 1997**

The Biodiversity Action Plan for Bhutan (BAP) was prepared by a task force made up of multiple Ministries (Agriculture, Finance, Trade and Industries, Health and Education, and Planning); the National Environment Commission (NEC); Bhutan's environmental nonprofit organization, The Royal Society for the Protection of Nature (RSPN); the World Wildlife Fund (WWF); United Nations Development Programme (UNDP); and other government agencies. The plan was intended to guide the nation in development strategies that uphold Bhutan's biodiversity. The taskforce was explicit when they defined BAP's role:

The BAP is a living document. It is an ongoing process, not a one-time document to be noted and set aside. The BAP provides a framework for action that will enhance Bhutan's ability to

ensure the productivity, diversity and integrity of its biodiversity and natural systems, and as a result, its ability as a nation to develop sustainably.”<sup>23</sup>

The BAP recognizes the need for community involvement in the process. It aims to give direct benefits to communities who strive for conservation and sustainable development.<sup>24</sup> They noted at the time of its creation that although the taskforce worked together in various workshops, many sections of the plan were prepared by specific individuals in a short timeframe and thus, the degree of coordination between groups was not ideal. Certain areas of focus were left out of the plan, whereas others were addressed in depth. But what BAP does demonstrate is that to preserve Bhutan’s biodiversity all sectors of the government must be engaged, as well as nonprofits working to shape Bhutan’s future. This collaboration was attempted though time constraints prevented it from being realized.

The BAP is divided into five chapters. Included in them are sections focused on arable-agriculture, horticulture, and wetlands. While the plan attempts to distinguish between wild and domestic biodiversity, it acknowledges both agricultural diversity and natural biodiversity as crucial aspects of the various ecosystems within Bhutan. Distinguishing between natural, untouched biodiversity and that “evolutionary process [that] has been influenced by humans to meet their needs,” the BAP recognizes that “there is actually often no clear dividing line between the two.”<sup>25</sup> Wild relatives of domestic crop plants may have great significant to domestic agriculture.”<sup>26</sup> The Renewable Natural Resources division of the Ministry of Agriculture includes both types of biodiversity in its scope of work. This acknowledgement has positive implications for the preservation of agricultural land for its unique ecosystem is recognized as valuable. The NEC is performing an economic valuation of biodiversity resources to assure sensitive land use planning, but it has not been applied to agricultural land.<sup>27</sup> Unfortunately the specific recommendations for the conservation of domestic biodiversity do not address protecting agricultural land from development. Rather, they recommend ways to increase productivity with plant genetics and botanical gardens.<sup>28</sup> If the BAP were to include rice paddies in its scope of protected areas, the country could take a significant step toward reaching its goals of cultural heritage and self sufficiency.

### **Bhutan 2020, A Vision for Peace, Prosperity and Happiness 1999**

In 1999, the Planning Commission drafted *Bhutan 2020: A Vision for Peace, Prosperity and Happiness*. In accordance with the agenda set forth to attain a middle path development strategy and Gross National Happiness, the vision statement identifies the Kingdom’s primary goals: achieving sustainability and maintaining cultural heritage. It specifically

addresses the need for continued environmental preservation efforts in order to satisfy the country's goals. Among its recommendations is encouraging the *dzongkhag* (district) and *geog* (neighborhood block) levels of government to become active in the sustainability of development projects, specifically in the Environmental Impact Assessment process.<sup>29</sup> Regarding the need for increased attention to watershed management, it states, "The highest priority should be accorded to the preparation of a management plan for the Wang Chu watershed."<sup>30</sup> Recognizing the influence that current development has on this watershed and the subsequent influence it will have on others, this recommendation is proactive and should not be taken lightly.

While the vision notes that "progressive removal of vegetation cover, especially in critical watershed areas, is beginning to affect the hydrological balance, leading to the localized drying up of perennial streams and flash floodings," it makes no mention that the risk is likely to increase with the spread of housing and commercial development in the valleys.<sup>31</sup> Like the majority of other environmental legislation, it addresses the effects of large, industrial development projects, but not the cumulative effect of housing and commercial development on the environment. What is most promising about *Bhutan 2020* however, is its acknowledgement that the existing environmental legislation "does not go far enough in a number of areas."<sup>32</sup> It suggests that new legislation addressing "the consequences of a rapidly growing urban population" be added to the current regulations.<sup>33</sup> If this advice is taken and the vision statement is realized, Bhutan's environment will be in much better shape.

### **Environmental Assessment Act, 2000**

The Environmental Assessment Act of 2000 introduces His Majesty's commitment to environmental preservation with a strong statement:

...development must not take place at the expense of our natural resources. It is because of this political will and our traditional reverence for nature that Bhutan is today blessed with a rich natural environment.<sup>34</sup>

Assuming the BAP upheld its goal to be a living document, agricultural land and its natural value will be included in the Act's definition of natural resource. In its efforts to preserve the nation's natural and cultural resources, the Act stresses the government's commitment to the "middle path" sustainable development strategy. The Act focuses on the process that development proposals must go through in order to be approved. Every development project requires an environmental clearance. Before an environmental clearance can be granted, a project must undergo an environmental assessment process:

Any person who seeks to carry out a project that requires a development consent shall include in the application to the competent authority a description of the potential environmental effects of the project.<sup>35</sup>

Depending on the scale of the project, the “competent authority” could be the National Environment Commission, The Secretariat of the National Environment Commission, The Nature Conservation Division, or a local planning division. The process includes preparing the application, submitting the application, screening of the application, notification of people who may be affected by the development, modification or renewal process, and finally, the clearance process.<sup>36</sup> If implemented, this act could be the key to preserving agricultural land in the valley. (See *Appendices A-1 and A-2* for flowcharts of the process)

However, part of Bhutan’s problem in implementation is posed in Article 18 where the Act describes explicitly all the requirements that must be met before clearance is granted. They include:

- The effects of the project on the environment are foreseeable and acceptable
- The applicant is capable of carrying out the terms of the environmental clearance
- The project, alone or in connection with other programs or activities, contributes to the sustainable development of the Kingdom and the conservation of its natural and cultural heritage
- Adequate attention has been paid to the interests of concerned people
- The project is consistent with the environmental commitments of the Kingdom<sup>37</sup>

While these requirements display a comprehensive and thorough development strategy, the current development demands that DUDH and TCC must meet make it impossible to satisfy all of the requirements in a timely manner. Already the country’s planning and development departments are understaffed and overextended.<sup>38</sup> This predicament is only going to get worse in the coming years as development and urbanization are predicted to continue to increase. There is not an adequate number of trained staff to involve the concerned communities, to review each and every development project, or to determine if an applicant is capable of following through with compliance once the approval has been granted.

To make the process transparent, Article 28 defines what the competent authority is responsible for in each application:

When a decision on the environmental clearance has been taken,

the Secretariat or the competent authority shall make a public announcement of the decision and make the following information available to the public:

- A description of the project
- The environmental terms
- A description of measures to avoid or mitigate potential adverse impacts and enhance positive impacts of the project
- The main reasons and considerations on which the decision is based, including the basis for the acceptance or rejection of views and arguments presented by other authorities and concerned people
- A non-technical summary of the information under Sub-articles 28.1 to 28.4<sup>39</sup>

These requirements have the potential to adhere to the principles of community participation models of planning, if the human resources, community involvement, technical expertise, and political will are present to follow through with these requirements.

Similarly, Chapters VI and VII make the monitoring process explicit, describing what is considered an offense, and the penalties non-complying projects face. The articles are concise and, if enforced, have the potential to be effective in encouraging sustainable development that respects the country's resources. Two questions remain: do the individual government departments have the capacity to enforce the regulations? Are the regulations given priority by government leadership and upper management officials?

### **Additional Environmental Acts and Legislation**

In addition to the above-mentioned acts, the National Environment Commission wrote six environmental sectoral guidelines in 1999. They include guidelines for the implementation of hydropower plants, power transmission lines, highways and roads, new and existing industries, forestry, and mining and mineral processing. After these guidelines were written, NEC, the Environmental Codes of Practice (ECOP), and DANIDA followed up with specific guidelines for urban sector in 2000.<sup>40</sup> Together they prepared three more codes of practice. These additional guidelines focused on sewage and sanitation, solid waste management, and urban roads and traffic management.

The depth and breadth of these guidelines demonstrate the comprehensive approach the Royal Government is using to address urbanization. They are not addressed specifically in this analysis because the magnitude of the country's environmental legislation is too expansive to include in detail. However, it should be noted that they are intended to guide the country "in the urban planning and

implementation process” ongoing in Bhutan.<sup>41</sup> What is not included in these guidelines is environmentally sensitive development and construction techniques because they are not considered within the domain of NEC. However, DUDH does not prioritize the environment as NEC does. This disjunction is likely to prevent the implementation of sustainable “middle path” development.

## Existing Development Regulation

### Draft Development Control Regulations, 2002

The consultant firm of Christopher Charles Benninger Architects Ltd. has drafted the Development Control Regulations in coordination with the Structure Plan for the city of Thimphu. These regulations, though still in draft form, will aid DUDH and TCC in their future development plans. They are meant to control all aspects of development within the city limits. TCC is identified as the “implementing authority” for all development within the municipal boundary, whereas DUDH’s jurisdiction falls outside the boundary, with the exception of a 400 sq mt radius around the dzong and residential buildings up to two storeys high in the Urban Control Zone (UCZ).<sup>42</sup> This means that TCC’s staff of less than ten planners and engineers will be responsible for ensuring a well-planned city of 50,000 people. This task is far from realistic. Benninger believes the Council should hire outside professionals because too many advisors and too few implementers are preventing Thimphu from reaching its goals.<sup>43</sup> He sees the need to hire more physical planners. Nine newly-trained architects returned to Bhutan from school this year, eight more will return to practice next year. Though this increase will help, the amount of staff needed to oversee the development in the valley will not be satisfied with them alone.

CCBA recommends that all projects, regardless of scale, should be required to be prepared, or at least submitted (in the case of buildings constructed of traditional materials), by a registered architect. Though such requirements are typical in most countries, the issue of capacity will be sure to flare up considering the high demand vs. limited architects in Bhutan. Other aspects of the control regulations are as exacting and it remains unclear how the current capacity of development authorities will abide by them.

Meanwhile, the roles of NEC and the Ministry of Agriculture are peripheral and unclear. Only in the case of construction of ‘non-residential structures, any building more than four floors or public use or occupancy buildings’ is NEC’s clearance of an Environmental Impact Assessment (EIA) required. Interviews with NEC revealed that environmental clearance of smaller development projects, like

single residences, was to be performed by TCC. So while each development proposal must conform to traditional architecture guidelines, only residences higher than four floors or those used for purposes other than living will have to abide by environmentally sensitive regulations.<sup>44</sup> Otherwise, the only other reference to environmental clearance appears in Section 2.3 of the control regulations where it states:

The proposal submitted shall be in conformity with other following Acts/Regulations and shall, wherever applicable submit the [No Objection Certificate] NOC, or clearance, from the respective authorities for conformity with:

- The provisions of Environmental Assessment Act, 2000
- The provisions of NEC Secretariat's, 'Regulations for the Environmental Clearance of Projects, 2001'
- The Department of Forestry Services, Ministry of Agriculture, RGOB for:
  - Surface collection of sand and boulders
  - All other activities governed by the Forest and Nature Conservation Act, 1994 and Rules, 2000, except sections that require NEC's clearance
- The Department of Research and Development Services, Ministry of Agriculture, for:
  - Farm roads
  - Irrigation channels
  - Activities related to agriculture research and development <sup>45</sup>

These restrictions exclude assessment of building construction and development of agricultural land. Nor are guidelines for environmentally sensitive storage and removal of construction debris offered.<sup>46</sup> They are considered outside the scope of environmentally sensitive regulation.

To further describe how the regulations lack clarity and explicit direction, a particular section in the *Land Development and Subdivision Regulations* chapter is reviewed in depth in this analysis (*see table right*). This section states that development in particular zones must gain what is called a No Objection Certificate (NOC) from the appropriate departments, but it does not state which aspects of development the specific departments can object to. Development in the Environmental Conservation Precincts (E-1), Forest Environments (E-2), National Open Green Spaces (G-1) and Green Space System (G-2) zones requires NEC's approval with the issuance of a NOC. The Agricultural Environments (E-3) and Agri-based Environments (E-4) zones require an NOC from the Ministry of Agriculture. And the Traditional Village (TV) zone requires an NOC from the NCCA. While this is a start in the right direction, the vagueness of the NOC's area of influence suggests that its ability to stop a project is unlikely. For example, a

previous section, which describes the special conditions and restrictions for each zone, contradicts the NOC section noted above. While it states that development in the G-1 and E-1 zones are “to be cleared by the NEC,” no restrictions are given to zone G-2, despite that, as stated above, it too requires a NOC from NEC.<sup>47</sup> Development in the E-2 zone is required “to be cleared by the Forest Department and the NEC.”<sup>48</sup> The special conditions and restrictions for the E-4 zone state that “dumping of solid industrial waste is subject to a NOC and conditions laid down by NEC and the Department of Industry.”<sup>49</sup> Whereas zone E-3 states, “in case of public and semipublic uses and buildings of charitable and religious purposes the implementing Authority may permit development activities to the extent of 10% of the land area.”<sup>50</sup> There is no mention of a mandatory NOC given by the Ministry of Agriculture or the NEC. This review has intended to show how ambiguous and confusing the development regulations are regarding other departments’ ability to influence development.

*The table below shows the discrepancy in the No Objection Certificate (NOC) process and the requirements by which development projects must abide.*

Zone	NOC Required from	Special Conditions and Restrictions
E-1	NEC	"To be cleared by the NEC"
E-2	NEC	"To be cleared by the Forest Department and the NEC"
E-3	Ministry of Agriculture	"In case of public and semipublic uses and buildings of charitable and religious purposes the implementing Authority may permit development activities to the extent of 10% of the land area."
E-4	Ministry of Agriculture	"Dumping of solid industrial waste subject to NOC and conditions laid down by NEC and the Department of Industry"
G-1	NEC	"To be cleared by the NEC"
G-2	NEC	None
TV	NCCA	None

The regulations do address the development of riparian zones. Rivers and major streams are treated differently than those classified as rivulets and minor streams, where the former has a buffer zone of 30 m from the waters edge, and the later, a zone of 15 m free from construction.<sup>51</sup> A detailed section describes which natural landscape features cannot be “damaged or disturbed from their natural state of being.”<sup>52</sup> It also stresses that roads and electrical infrastructure are prohibited in these zones. Yet it does not make any judgements about sewage and water lines within the buffer. Aside from riparian zones however, a general requirement is stated at the end of the Land Development and Subdivision Regulations section, which appears to be the only other reference to sensitive development:

The proposed development should not be likely to involve damage to or have a deleterious impact on the ecology or be

against the aesthetic sensibility within the environmental setting or be against public interest.”

Such a vague statement is likely to be misinterpreted or ignored by developers.

### **Other Physical Planning Regulations**

Careful attention has been dedicated to preserving the architectural elements that have articulated Bhutanese identity in built form. The Traditional Architecture Guidelines are a detailed collection that requires all newly built structures to reflect tradition. Yet traditional site orientation and planning have no such guidelines. This distinction has resulted in the termination of traditional site planning. Its analysis of traditional site planning is absent from today’s environmental and development policy. Traditional structures cannot be viewed outside their physical context. They responded to the natural environment in which they were constructed. The land form, slope, soil conditions, wind patterns, orientation to the sun and proximity to natural water sources have guided the Bhutanese in their construction techniques and settlement patterns in the past. This attention informed generations of Bhutanese settlements. It created structures that met the needs of the inhabitants, while responding to and respecting the surroundings’ natural conditions. Traditionally unique settlements blended into the hillsides and valleys. Yet, no attempt to learn from traditional development approaches is demonstrated in the environmental conservation regulations nor the development control regulations. The absence of environmentally sensitive planning techniques in these guidelines and the lack of coherence between environmental conservation and urban planning regulations are problematic.

### **Summary**

Bhutan’s legislation captures the potential and progressive vision of the Royal Government. The numerous acts and plans sponsored and/or supported by the Royal Government reveal the government’s intent to preserve the country’s natural resources. Yet interviews with the ‘competent authorities’ in Bhutan demonstrate that the current development pressures and lack of trained staff prevent such thorough legislation from being implemented effectively. In addition, these plans demonstrate the exclusion of agricultural land from mainstream conservation efforts. Farmland is included in some analysis, but not with the same degree of attention. If the cultural and environmental value of this land use is recognized in legislation, the need to preserve it would be much more evident. Finally, there remains a striking disconnect between modern site development and the preservation of Bhutan’s cultural landscape. Urban development is occurring

without regard to natural site conditions or traditional settlement patterns. Whereas traditional patterns of development reinforced the terraced landscape and maintained a balance between production and the environment. The current approach to housing development does not adhere to the environmentally and culturally sensitive sentiments expressed in the environmental acts.

Today, with increased reliance on modern materials and building techniques, the globalized hubris, which has led to innumerable mistakes worldwide, is smearing its ignorant mark on Bhutan's landscape. The sentiment that "if the Tata tractor can do it, it must be good" is beginning to speak louder than traditional Buddhist beliefs that treat nature with the highest respect.<sup>54</sup> This puts Bhutan in considerable danger of repeating the mistakes of the rest of the world. To remind us of the mentality of the United States, and societies like it, which have historically used money and convenience to rate their success, landscape architect and planner, Ian McHarg states:

We have but one explicit model of the world and that is built upon economics. The present face of the land of the free is its clearest testimony, even as the Gross National Product is the proof of its success. Money is our measure, convenience is its cohort, the short term is its span, and the devil may take the hindmost is the morality.<sup>55</sup>

If Bhutan lets short term, convenience-based development decisions dictate the future of its urban centers, it will not be far behind in repeating the mistakes of the Western world. As a nation, it must apply the breadth of environmental legislation to urban development decisions. International precedents follow in Chapter Four to demonstrate how governments and communities balanced their development needs with their goals to preserve or create culturally and environmentally rich regions.

## End Notes

- <sup>1</sup> Acharya, 36.
- <sup>2</sup> NEC, “Bhutan: The Path Towards Sustainable Development”.
- <sup>3</sup> NEC, Environmental Assessment Act, 2000, 1.
- <sup>4</sup> Acharya, 35.
- <sup>5</sup> CBS, *Gross National Happiness Discussion Papers*, 16.
- <sup>6</sup> CBS, *Gross National Happiness Discussion Papers*, 17.
- <sup>7</sup> NEC, “Bhutan: The Path Towards Sustainable Development”.
- <sup>8</sup> Acharya, 35.
- <sup>9</sup> <http://www.wwf bhutan.org.bt/wwfbhutanbackground.htm>
- <sup>10</sup> Acharya, 36.
- <sup>11</sup> Acharya, 36.
- <sup>12</sup> Acharya, 36.
- <sup>13</sup> NEC, “Biodiversity Action Plan for Bhutan”, 18.
- <sup>14</sup> MoA, The Forest and Nature Conservation Act of Bhutan, 1995, 11.
- <sup>15</sup> MoA, The Forest and Nature Conservation Act of Bhutan, 1995, 11.
- <sup>16</sup> MoA, The Forest and Nature Conservation Act of Bhutan, 1995, 17.
- <sup>17</sup> MoA, The Forest and Nature Conservation Act of Bhutan, 1995, 31.
- <sup>18</sup> MoA, The Forest and Nature Conservation Act of Bhutan, 1995, 34-43.
- <sup>19</sup> MoA, The Forest and Nature Conservation Act of Bhutan, 1995, 19.
- <sup>20</sup> MoA, The Forest and Nature Conservation Act of Bhutan, 1995, 20.
- <sup>21</sup> MoA, The Forest and Nature Conservation Act of Bhutan, 1995, 21.
- <sup>22</sup> MoA, The Forest and Nature Conservation Act of Bhutan, 1995, 24.
- <sup>23</sup> MoA, The Biodiversity Action Plan for Bhutan, 16.
- <sup>24</sup> NEC, “Biodiversity Action Plan for Bhutan”, 5.
- <sup>25</sup> NEC, “Biodiversity Action Plan for Bhutan”, 20.
- <sup>26</sup> NEC, “Biodiversity Action Plan for Bhutan”, 20.
- <sup>27</sup> NEC, “Biodiversity Action Plan for Bhutan”, 7.
- <sup>28</sup> NEC, “Biodiversity Action Plan for Bhutan”, 6.
- <sup>29</sup> Planning Commission, *Bhutan 2020: A Vision for Peace, Prosperity and Happiness*, 89.
- <sup>30</sup> Planning Commission, *Bhutan 2020: A Vision for Peace, Prosperity and Happiness*, 89.
- <sup>31</sup> Planning Commission, *Bhutan 2020: A Vision for Peace, Prosperity and Happiness*, 37.
- <sup>32</sup> Planning Commission, *Bhutan 2020: A Vision for Peace, Prosperity and Happiness*, 89.
- <sup>33</sup> Planning Commission, *Bhutan 2020: A Vision for Peace, Prosperity and Happiness*, 89.
- <sup>34</sup> NEC, Environmental Assessment Act, 2000, 1.
- <sup>35</sup> NEC, Environmental Assessment Act, 2000, 5.
- <sup>36</sup> NEC, Environmental Assessment Act, 2000, 5-8.
- <sup>37</sup> NEC, Environmental Assessment Act, 2000, 6.
- <sup>38</sup> DUDH, TCC Interviews.
- <sup>39</sup> NEC, Environmental Assessment Act, 2000, 8.
- <sup>40</sup> NEC, “Environmental Codes of Practice for Solid Waste Management in Urban Areas”, 2000, forward.
- <sup>41</sup> NEC, “Environmental Codes of Practice for Solid Waste Management in Urban Areas”, 2000, 1.
- <sup>42</sup> CCBA, Draft Development Control Regulations 2002, p 1.
- <sup>43</sup> Benninger, CCBA.
- <sup>44</sup> CCBA, Draft Development Control Regulations 2002, p 25.
- <sup>45</sup> CCBA, Draft Development Control Regulations 2002, p 30-31.
- <sup>46</sup> CCBA, Draft Development Control Regulations 2002, p 38.
- <sup>47</sup> CCBA, Draft Development Control Regulations 2002, p 44.
- <sup>48</sup> CCBA, Draft Development Control Regulations 2002, p 44.
- <sup>49</sup> CCBA, Draft Development Control Regulations 2002, p 45.
- <sup>50</sup> CCBA, Draft Development Control Regulations 2002, p 45.
- <sup>51</sup> CCBA, Draft Development Control Regulations 2002, p 54-55.
- <sup>52</sup> CCBA, Draft Development Control Regulations 2002, p 55.
- <sup>53</sup> CCBA, Draft Development Control Regulations 2002, p 56.
- <sup>54</sup> DUDH, Private Developer Interviews.
- <sup>55</sup> McHarg, 1992, 25.

# **Chapter Four:**

## *Analysis of Precedents*

As the introduction alluded, Bhutan is not alone in its attempt to balance development needs with environmental quality and cultural heritage. This chapter reviews five precedents from regions around the world that have attempted to preserve their cultural and/or natural landscape in their development approaches. Based off of the interviews, field research and review of existing legislation, this analysis determined that Bhutan's approach to development can be improved when the following six development principles are followed:

- traditional sources of livelihood are recognized as an integral part of culture
- undeveloped land is valued economically
- environmentally-sensitive development techniques respond to traditional settlement patterns
- environmentally-sensitive development is valued economically
- the detrimental effects of new development's increased water runoff and erosion are minimized
- citizens are involved in all phases of development

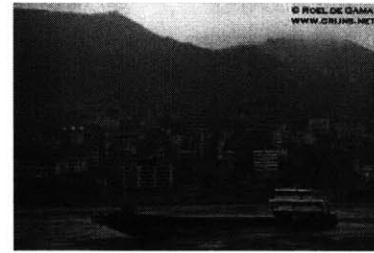
The five precedents were chosen because they uphold one or more of these development principles. While they range in their political, physical, and cultural structures, their ability to apply sensitive development principles shows how a progressive country like Bhutan can apply them as well. Each precedent illustrates positive and negative aspects of planning, serving as examples of best and worst practices. The research methodology used in this analysis was secondary source data collection. The precedents were initially reviewed in planning and development journals and databases and were not directly analyzed by the author.

### **Comprehensive Revitalization of Urban Settlements Chengdu, China Best Practices Database UN-Habitat**

This precedent serves as a worst case scenario that is transformed through locally-driven environmental remediation and urban planning efforts and community participation. Once one of Southwest China's most polluted cities, Chengdu transformed its environmental conditions and its residents' quality of life through its own motivation. A "riparian city" surrounded by the Fu and Nan Rivers, Chengdu suffered through years of industrial waste and poor infrastructure. Overtime, the neglect destroyed Chengdu's identity as a charming and culturally diverse city. Once rich in artistic, literary and cultural heritage, Chengdu had become an overcrowded, poorly planned, industrial city without any reverence for its cultural or natural resources.

### *Catalysts:*

Years of agricultural and urban abuse dried up the rivers during the dry season and flooded them during the rainy season. Sewage discharge pipes led directly into the rivers, turning the city center into “a large sewage pit.”<sup>1</sup> The sewage, combined with built up silt and garbage from water runoff, posed major flood hazards resulting in \$3-10 million USD in damage per year between 1980-1990. In addition, squatter settlements and shantytowns along the riverbeds further contaminated the rivers and eroded the banks. The government turned its back to them, pretending they did not exist, and thereby pretending the rivers were not affected by such misuse. Finally in 1985, a group of elementary school students made a difference. They sent a letter to the mayor requesting that they save the river. “The letter struck a vibrant chord with the general public and awakened the municipal government to act.”<sup>2</sup>



*Dense urban development along the riverbanks, pollution, and lack of care severely contaminated the Fu and Nan Rivers.*

*Source: [http:// www.grijns.net/vacation/china/china.html](http://www.grijns.net/vacation/china/china.html)*

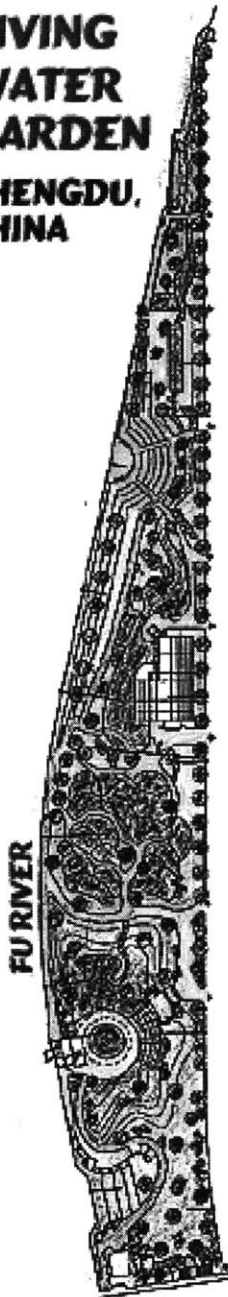
### *Planning, Design, and Development:*

Perhaps the most central aspect of this huge remediation effort was the city’s relocation of the 30,000 households along the riverbanks. The relocation process was critical in the overall success of the project. In meetings held with political representatives, community representatives, and administrative officers, the residents were directly involved in the formulation of policies and reaching project goals. The process of relocating the residents of the squatter settlements was considered “smooth and successful”. It not only “achieved the project’s social objective of improving living conditions, but also resulted in the social inclusion of 100,000 previously excluded people.” The relocation was done systematically so that neighborhood relations and social ties that had been maintained over the years were respected. Extended families were relocated into the same new housing estates. Elderly, single-parent families and other individuals needing extra assistance were integrated into the new housing to uphold traditional neighborhood support networks.

Unique to this project, the media was an active participant. They were present at the community meetings to document the process and share the project objectives and expected outcomes with the general public, thus keeping the city at large informed of the project development. Their work allowed the general public to reach consensus on identifying lots that were considered acceptable for relocation and how each resident could be granted a new home with the same floor area.<sup>3</sup>

The project recognized the interconnectedness of restoring Chengdu’s natural and cultural resources. The new plan integrated the natural landscape, recreational and cultural areas along the rivers and within the city center. Replacing the squatter settlements along the banks

## LIVING WATER GARDEN CHENGDU, CHINA



*The Living Water Garden demonstrates the filtration process that cleans river water, while providing an attractive public open space.*

*Source: [http://cgee.hamline.edu/rivers/Inquiry/RTT/rtt\\_bsy1.htm](http://cgee.hamline.edu/rivers/Inquiry/RTT/rtt_bsy1.htm)*

with revegetated green corridors helped to restore the ecological balance. Direct sewage discharge into the rivers was stopped once the government renovated and equipped the latrines along the rivers. A filtration system through which river water is directed uses a series of ponds, reed beds, aquatic animals and other native plants to cleanse the water, making it safe for recreational use. Meanwhile the protection of cultural heritage was integrated into the environmental protection efforts. The restoration of the natural landscape and water quality is now connected to new public gardens that incorporate cultural and historical sites and allow Chengdu's citizens to have "regained links with nature, culture and tradition and now have a strong sense of ownership of their city."<sup>4</sup>

### *Management:*

The project required a capital investment equivalent to an entire year of the city's total revenue. In order to be able to finance such a large-scale project, the city came up with unconventional strategies. They "established multi-stakeholder partnerships with civil society organizations, neighborhood associations, schools, educational and research institutions, private real estate developers, state administrations, and construction companies."<sup>5</sup> These joint ventures enabled the city government to reinvest the profit from initial aspects of the project into later stages. In addition, private developers participated in a competitive bid process, "ensuring the trust and confidence of the private sector."<sup>6</sup>

### *Lessons:*

As the project goals were met, Chengdu residents "witnessed a dramatic improvement in their living conditions and environment."<sup>7</sup> The project which initially seemed impossible to finance without the assistance of international aid agencies, proved to be profitable to the city. Local industries were boosted by the need for infrastructure and housing development. This boost in the local economy, in turn, attracted more investment, both foreign and domestic. In fact, the economic development resulting from the project in the construction, environmental planning and management, and building materials industries has taught Chengdu "that such a city can rely on its own resources and efforts to achieve tangible improvements in the living conditions of its inhabitants."<sup>8</sup> But above all, the project partners and the city of Chengdu consider "the true impact" of the project to be "the harnessing of people's ideas, contributions and participation to realize a vision for a more sustainable future."<sup>9</sup>

### *Application to Bhutan:*

Despite the discrepancy in the two cities' population and size and the advancement of degradation in Chengdu, Thimphu can learn from these efforts. The synergy between cultural and environmental heritage that is expressed in the urban revitalization of Chengdu is directly applicable to Thimphu as it attempts to develop into a modern city.

As in Chengdu, what happens in Thimphu has the potential to affect the rest of Bhutan, for good or bad. Thus, if Thimphu does not address how urbanization and careless treatment of the riverbanks and water are affecting the Wang Chu, then as it leaves the city, it will pollute other areas and bodies of water, thereby disrupting the quality of life of those dependent upon them. The participatory process used in Chengdu is applicable to Bhutan. As they noted, "rehabilitating the city and its riparian heritage has instilled a sense of pride and ownership among the citizens of Chengdu, possibly the most valuable and long-lasting benefit of all."<sup>10</sup> Bhutan's Broadcast System could serve as a means for information dissemination to facilitate community understanding and gain wide public support. In Chengdu, the project "nurtured many officials with a keen sense of sustainable development" and many of them were able to transfer their expertise to other districts within the country.<sup>11</sup> Similarly, if government officials in Thimphu gain successful experience in sustainable planning and management for the region, their skills can be invaluable to the rest of the nation where similar proactive efforts are necessary to prevent damage to Bhutan's cultural and environmental integrity.

## **Water Sensitive Residential Design**

### **Perth, Western Australia**

**By David Hedgcock**

***Australian Planner, December 1993***

This precedent demonstrates how a city changed its housing development strategies to respect the natural landscape, improve the region's environmental quality, and do so with more economic efficiency than their previous techniques.

Sitting in the low sandy Swan Coastal Plain, Perth's environment was not ideal to its European settlers, hence they planned and built their homes and businesses without regard to sustaining the natural conditions. After centuries of "crude solutions to a complex environment", the people of Perth began to see how their approach to housing development was drying up the ground water sources, polluting the rivers and streams, and generally destroying the wetland ecosystems in the region.

*Catalysts:*

Once it became obvious that the natural environment “that had been so fundamentally mismanaged and misunderstood in the cause of economic and cultural hegemony” would not be able to support future generations, an interest group organized themselves to discuss alternative housing development strategies.<sup>12</sup> The group, representing academics, local government and public service officials, and developers, determined that if development continued as it was, the region’s local surface and groundwater sources would be exploited by 2030.<sup>13</sup> In response to a new proposal for housing development atop a sensitive ground water area and intricate wetland ecosystem, the group saw the need to remind Perth’s citizens and professionals of the importance of water “as the life source on the Swan Coastal Plain; for its animals, its vegetation and its people.”<sup>14</sup> Responding specifically to the effects that their lifestyle and development patterns had on Perth’s water balance, water quality and water consumption, they began to plan a water-sensitive development approach.

*Planning, Design, and Development:*

The proposed alternative planning process aimed to “move away from engineering led solutions to more ecologically responsive strategies designed to renegotiate the development response to the environmental conditions.”<sup>15</sup> Previously, development was considered a success if engineers could manage to alter the landscape to meet the needs of the residents and the city, rather than to respond to the natural conditions in their design. Until this point, the pressures to develop and provide enough housing for residents dominated Perth’s ability to design and plan with sensitivity. The pressure was described as such:

The mood of the then boom times dictated that the traditional suburban carpet be laid out over the area in the shortest possible time with all its attendant problems for the water regime.<sup>16</sup>

In reaction, the group saw the need to reassert the importance of water in such a way that it would not be “marginalised in the hysteria of a boom development mentality, but rather it should be seen as the golden thread running through the development process.”<sup>17</sup>

*Management:*

In order for the group to become effective, it was recognized as an official subsection of the city’s Planning and Management Committee. By becoming an institutionalized body, the group had greater access to decision makers throughout city government; its members could give advice to and gain support from them. This helped their efforts become part of the mainstream planning and development efforts.

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**WATER TABLE CHANGES IN THE COURSE OF URBANISATION**

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CHANGE IN LAND USE OR WATER USE	EFFECT ON WATER TABLE
<i>Pre-urban to early urban transition</i>	
Removal of vegetation	Raised
Drilling of wells and water extraction	Lowered
Septic Tanks and leach drains	Raised
<i>Early urban to middle urban transition</i>	
Institution of drainage	Lowered
Construction of housing and streets	Raised
Abandonment of wells used by previous land use	Raised
<i>Middle urban to late urban transition</i>	
Increase in urban density	Raised
Abandonment of wells due to pollution	Raised
Construction of sewerage systems	Lowered
Increase in imported water use	Raised
Waste water reclamation and reuse	Raised

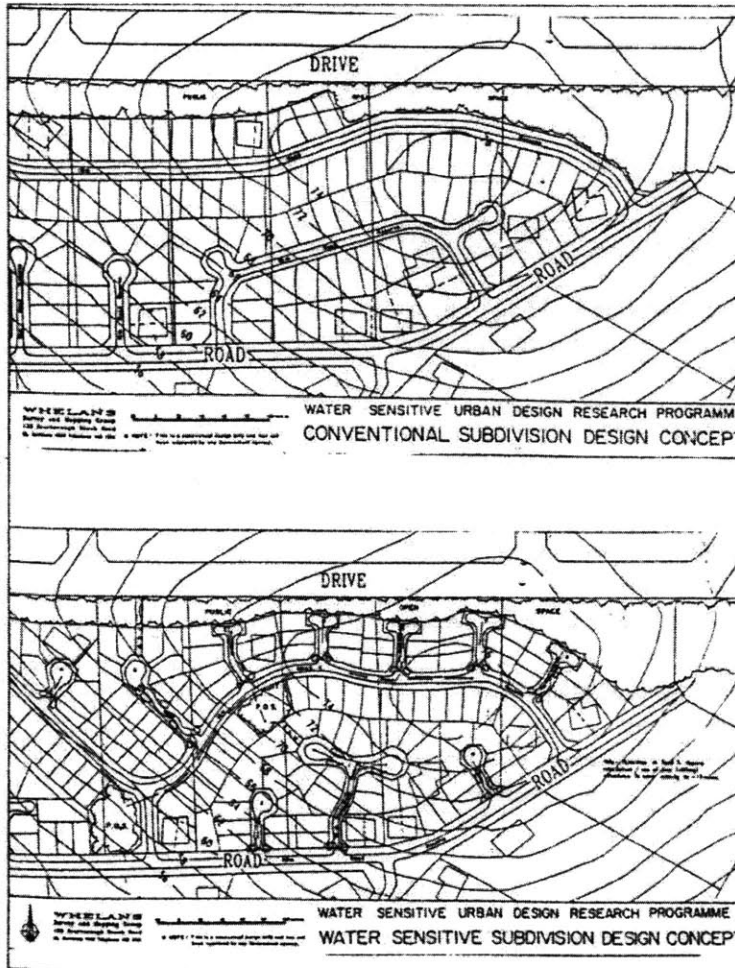
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*The table above categorizes development and infrastructure's effect on the water table.* Source: *Australian Planner*, December 1993.

Using readily available sensitive design guidelines and adding to them, they produced a site responsive package to aid future developers. They included the following requirements:

- site responsive techniques
- small lot subdivisions
- increased housing density to reduce private open space
- increased public open space provision to accommodate dual use for recreation and drainage purposes
- localised stormwater disposal at high points in the landscape to disperse infiltration
- closer integration of residences and public open space
- non-contiguous residential development
- increased localisation and an associated decrease in the scale of residential infrastructure (including water, sewerage, drainage and stormwater disposal systems)
- narrower road widths to restrict the volume and concentration of stormwater runoff
- more explicit long term management control of residential development forming part of the approval process and established through controls on title
- localized community water supply
- environmental problems resolved internally within a development [i.e. runoff is treated onsite and is not allowed to pollute other areas]
- products of urban processes passed onto the larger environment as benefits rather than costly liabilities
- application of water sensitive design principles to existing development and redevelopment sites<sup>18</sup>

The group tested these requirements on a development site that was partially wetlands and above a groundwater mound. Two development schemes were applied to the site. The first used Perth's traditional development approach, the other used the water and site sensitive design criteria. The latter development proved to be less costly on a per lot basis, and thus was "justified on environmental and economic grounds."<sup>19</sup>



The top plan shows a conceptual site design for a conventional subdivision. In contrast, the lower plan shows how water sensitive site planning can provide the same number of lots, use more care in preserving the existing site conditions, and save money in the process.

Source: *Australian Planner*, December 1993.

**Lessons:**

The planners in Perth realized they needed to understand the delicate natural conditions of the region and allow them to create a unique sense of place, rather than stamping a generic housing development onto the landscape regardless of its terrain or natural conditions. After generations of ignoring the natural conditions, the Department of Urban Planning and Development of Perth realized their approach was causing tremendous damage to wetlands ecosystem and the local water quality.<sup>20</sup> This shift in mentality enabled the planning group to base future projects on "a rich and sympathetic understanding of the generous and delicate natural conditions that form part of a sense of place."<sup>21</sup> Both designers and professionals involved in development responded positively to the innovation and lack of uniformity that the new designs offered. The Department has used the guidelines for the future planning of housing developments. They also noted that significant public participation can aid in rethinking how water and land resources get used.<sup>22</sup>

### *Applications to Bhutan:*

Unlike Perth, Bhutan's traditional architecture and planning does not dominate the natural landscape. Rather, historically human settlements have harmonized with the surrounding environment. But new development trends are showing less and less respect for the natural form of the landscape and its capacity to withstand construction. Such development has the potential to follow the destructive path that Perth's European settlers chose. Bhutan has the option to veer away from developing sprawling housing settlements that are pre-designed before a site is chosen. Following the standards that Perth planners set for themselves can help guide modern Bhutanese developments so that they highlight the specific qualities of each site and use sensitive techniques to limit development's effect on the environment.

As Thimphu finds itself in a housing crisis, it is easy to overlook the long term effects of development for the short term benefits. What is especially critical in the case of Perth is how the city found an economical and timely approach to avoid detrimental new development. By creating a team specifically dedicated to environmentally sensitive development that worked directly with city government, their efforts were institutionalized and not placed on the periphery of development decisions. Such an effort could serve as a realistic model to Bhutan. Perth's concern to design new housing developments that responded to the natural terrain, existing water sources (including ground water), and soil quality did not prohibit them from creating affordable housing for their residents. Rather, the process proved to be more economically efficient than their traditional subdevelopments.

### **The Ifugao Rice Terraces Codilleras, The Philippines Multiple Sources**

As mentioned in the introduction, Ifugao's terraced paddies have been recognized as an invaluable cultural and natural resource to the Philippines and the world at large. In 1995, the unique terraces were classified as a World Cultural Heritage site by UNESCO. "Constructed following the bulges and depressions of the terrain, the terraces are the forerunners of the so-called 'modern' technique of contour farming."<sup>23</sup> Until recently, the Ifugao people maintained their labor-intensive traditional farming techniques, ceremonial rites, and land holdings system.<sup>24</sup> Over time, to preserve the forests, the Ifugao reforested areas and were selective in the trees they cut. Despite these traditionally sensitive practices and their recognition by UNESCO, unplanned, adhoc development on the terraces currently "threatens to erode the heritage landscape."<sup>25</sup>



*The Ifugao terraces (as shown in the figures above and below) are carved out of steep mountainsides and range from five to fifty feet in height. Manual labor is required to farm and maintain the terraces.*

*Source (of above): <http://www.asiarice.org/sections/riceheritage/mountains6.html>*

*Source (of below): [members.tripod.com/billedo/banaue.html](http://members.tripod.com/billedo/banaue.html)*





*Traditional homes are clustered between the rice paddies. The density strengthens the community's social structure and leaves more land available for farming.*

*Source: [members.tripod.com/billedo/banaue.html](http://members.tripod.com/billedo/banaue.html)*

### *Catalysts:*

The International Union for Conservation of Nature (IUCN) and the International Council for Monuments and Sites (ICOMOS) conducted analysis to determine how the heritage site was being maintained. Close to 20-30% of the terraces were found to be deteriorating.<sup>26</sup> Their report stressed the importance to the Philippine government to formulate a “long-term comprehensive conservation plan” because without it, “it is impossible to guarantee the preservation and sustainable development of the paddies.”<sup>27</sup> In response, the governor of Ifugao has acknowledged that saving the rice paddies “was no longer a parochial concern of the Ifugaos, but of the whole nation.”<sup>28</sup> Only now is the Filipino government mobilizing to raise funds that will be used to support the preservation efforts. Their restoration and preservation process is in its initial stages, but their acknowledgement of the need to protect this landscape as a natural and cultural resource is a critical first step.

### *Planning, Design, and Development:*

The Philippine government is responding by “mobilizing an effective, decisive and rapid intervention for addressing the threats facing the site.”<sup>29</sup> The Philippines National commission for UNESCO and the local Banaue Rice Terraces Task Force are working together to engage the local communities with cultural heritage education, hydrological studies that reinforce their cultural relationship with the land, and ways to “revive and update traditional agricultural skills.”<sup>30</sup>

However, the Ifugaos’ need to earn a living is threatening their landscape and culture. With international competition and market prices, their rice is no longer enough to support them. They are moving to the cities and even as far as Manila to look for work. Meanwhile, cultural tourism is adding development pressure on the steep mountains. “Crudely constructed commercial buildings surrounding the area are the very first sight that greet the arriving tourists.”<sup>31</sup> For centuries, the farmers have been careful to cluster their housing in condensed areas, leaving the majority of land available for farming. There is concern that commercial and infrastructure development will obliterate this pattern and harm the terraces. Dedicated to “maintaining the authenticity and sustainable conservation of this fragile site,” the Bureau and the task force believe watershed management and buffer zones are crucial for the preservation of the terraces.<sup>32</sup>

### *Management:*

The challenge that remains is getting the Philippine government to commit to designing a comprehensive management plan for the terraces. Especially evident in this precedent is the priority to meet

the needs of the local populations. The previous development plans had to be revised so that they “ensure the socio-economic development needs of the local inhabitants are met while maintaining the authenticity and sustainable conservation of this fragile site.”<sup>33</sup> Some suggest that the agriculture department should hire the local farmers to reconstruct the paddies that are in need of repair, and maintain those that are in good condition.<sup>34</sup> Another recommendation is for the government to purchase their produce at a fixed rate, so residents do not need to look for other means of livelihood. This would provide the Ifugao with regular employment and income. To help the preservation and planning process, the IUCN/ICOMOS team recommends that an annual evaluation of the Six-Year Rice Terraces Master Plan take place. They also believe holding an international planning workshop can help the evaluation.<sup>35</sup>

#### *Lessons:*

The changes in governance and transition of commissions and taskforces “represent a weakening of political commitment and too little appreciation of the international significance of the World Heritage designation to the rice terraces.”<sup>36</sup> Local and national commitment to conservation is necessary, despite international attention or status. That is, even with the title of World Heritage Site, the terraces are still in threat of deteriorating. Thus, local and national government is critical to the terraces’ preservation.

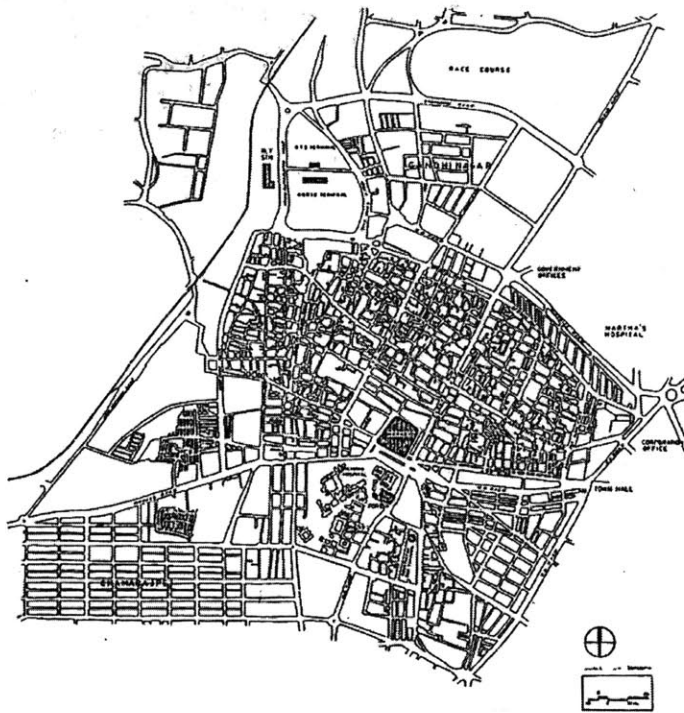
#### *Applications to Bhutan:*

The efforts in Ifugao are not just attempts to preserve a specific land use for the sake of physical beauty. Rather they are attempts to maintain the culture and identity of a people by recognizing the value of the land and its history. The Ifugao landscape holds “great international significance in landscape management because the terraces are an excellent example of interweaving of natural values in a sustainable manner.”<sup>37</sup> What is unique about this site is that environment and culture are inextricably tied. To preserve one aspect of their heritage requires the preservation of the other. A Delegate from Zimbabwe recognized the effort in Ifugao, Cordillera as a global example: “The maintenance of the ecosystem of this site, being intimately linked to the traditional ways of life of the local communities provides a good precedent study for sustainable management”.<sup>38</sup> Ifugao provides Bhutan with insight at the international significance given to rice paddies elsewhere.

## Cultural Continuity in Development Bangalore, India

By Venkatesh Babu and Kalpana Kuttaiah  
Traditional Dwellings and Settlements  
Center for Environmental Design Research

This precedent exemplifies how one district within the highly industrialized and rapidly developing cosmopolitan city of Bangalore has maintained its culture, community, and economic viability as a result of its attention to traditional designs and planning patterns. It compares how modern development and planning approaches are threatening the city's rich cultural traditions, whereas traditional settlements that underwent gradual modernization maintain Bangalore's identity and vibrancy. Unlike the other precedents, this does not document a positive planning effort put in place by the government. Rather it shows how a traditional settlement is more beneficial to the residents and the environment than any of the current planned development approaches.



*The historic district has maintained its organic street pattern (middle right) whereas new planned development conforms to a strict grid (lower left).*

Source: Babu and Kuttaiah, *Traditional Dwellings and Settlements Working Paper Series*, 1996.

### *Catalysts:*

Bangalore was “originally a collection of villages strung along the Cauvery River,” and was considered the “garden city of India”.<sup>39</sup> Now dubbed the “doom city”, lack of infrastructure, over-population, pollution, and insensitive development has made it unrecognizable.<sup>40</sup> Increased “indifference towards traditional customs and values,” coupled with increased dependence on planning with an orthogonal grid of wide, car-friendly streets, indoor and outdoor private space, and the lack of attention to traditional social systems have not improved the quality of life of residents, preserved heritage, or maintained the natural landscape in Bangalore.<sup>41</sup> Rather this type of development is “destroying vernacular traditions.”<sup>42</sup> Resulting from globalization trends, development in India is

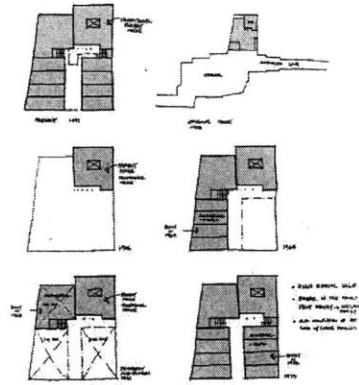
replacing “narrow irregular organic streets with straight, wider roads and slow moving pedestrian flow with fast moving, high volume traffic access.”<sup>43</sup> Their vernacular tradition based on the Indian Joint Family System and agricultural settlement patterns can only be modernized with sensitive, adaptive innovation that “evolve out of a natural process of social growth and change.”<sup>44</sup> The district has been able to modernize sensitively with “its basic imprint and its exuberance exist[ing] in the same manner as they have in the past.”<sup>45</sup>

**Planning, Design, and Development:**

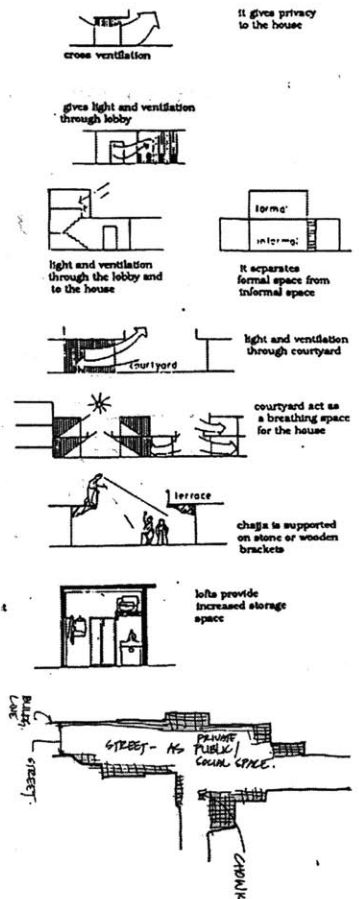
The traditional housing units include workspace, a hierarchy of open space and private space, and serve the needs of large extended families. The proximity of buildings to one another and the network of shared public space enable extended families to pool their resources and finances. This proximity also creates an environmentally sensitive microcosm where shade, light, and airflow are taken into consideration in the design and relationships between buildings. The homes’ thick walls provide thermal insulation, improving the quality of living conditions, as well as reducing timber use and inefficient energy use and heating systems. Clustered around courtyards, the homes moderate the outside temperature. These traditional design elements were not random decisions of the past, but intelligent responses to the natural conditions of Bangalore.

The historic settlement is ‘characterized by organic blocks with a hierarchy of winding and highly irregular streets, often culminating in cul-de-sacs.’<sup>46</sup> As a mixed-use neighborhood, it incorporates workspace, commercial uses, community facilities and social services among the residences. “This closeness between occupation and family life creates strong family ties and this leads to a strong sense of communality.”<sup>47</sup> The blocks “fit together in an intertwined mesh” to form rich urban fabric and “a variety of private and public spaces.”<sup>48</sup> The compact pattern provides residents with direct contact with neighbors, fostering a sense of safety, communal responsibility, and social kinship. In contrast, the officially planned neighborhoods are rigid and inflexible; the individual blocks within them lack identity and connection to each other. Usually zoned for a single land use, new neighborhoods are planned in isolation resulting in traffic problems and excessive commute time.

The current trend for more affluent families to leave the traditional village and construct homes in the outer areas of the city is negatively impacting them. “The spatial distance and physical barriers” of single family homes built on independently owned lots, surrounded by large private yards, gardens, and roads connecting them, has begun to “affect the traditions and values that were part of family life for generations.”<sup>49</sup>



*The gradual transition of neighborhood nodes (shown above) has allowed the district to densify with traditional sensitivity to environmental conditions that improve the residents' quality of life (shown below).*



Source: Babu and Kuttaiah, *Traditional Dwellings and Settlements Working Paper Series*, 1996.

The dependence on family members and neighbors for child and elderly care, economic support, and intergenerational experience with tradition is no longer possible.

*Lessons:*

Recognizing the value of upholding tradition and culture in times of rapid globalized urbanization, the observers in Bangalore state:

The system of values of a culture, in large measure, provides the rationale and sanction for the entire culture. These values are not random or arbitrary, but form a consistent and meaningful pattern, serving to define appropriate behavior between people.<sup>50</sup>

While the government of Bhutan has recognized the first statement and by doing so has been successful at maintaining a strong Bhutanese culture despite external pressures, the same recognition has not been paid to the latter statement. The preservation of traditional patterns of development have not been viewed as important culturally meaningful cues for the future of Bhutanese cities. In Bangalore, the authors recognized that “tradition and culture binds the society,” setting up a value framework for preserving “historical development, environmental conditions, natural resources, social evolution, intellectual and spiritual enlightenment.”<sup>51</sup> This framework cannot be formulated in an office, separated from the geographic formations and conditions that make the environment unique. Yet, such generic, insensitive methods are becoming the global trend in development and thus Babu’s statement that “no two cultures located in two different locations are exactly alike in their characteristics” is beginning to lose its validity.

*Applications to Bhutan:*

In Bangalore, the observers asked a series of questions to determine what traditions within historic settlements should serve as priorities for development. They included:

- What are the important values of a traditional historic settlement?
- What are the factors that are causing the changes in a settlement?
- What are the physical characteristics, spatial characteristics and values that should be conserved?
- What are the methods and means that should be adopted to conserve and protect sustainable traditions?<sup>52</sup>

These questions could be useful for Thimphu’s residents, city

government, and development professionals to discuss before more development projects are put into effect without sensitivity to the existing landuse patterns and historical relationships between farmhouse settlements and the agricultural land surrounding them. Unlike the new housing developments in Bangalore that spread into undeveloped agricultural land, this historic district conserves space and provides a healthier living environment for its residents. Without such attention, globalization and the mentality that modern development techniques are more progressive and technically savvy than traditional settlement patterns have the potential to transform Thimpu's unique built environment into a monotonous, sprawling city. As the case has shown, Bangalore, with the exception of the living culture evident in its historic district, has lost its identity.

## **Environment Friendly Urban Development Neuss-Allerheiligen, Germany Best Practices Database UN-Habitat**

Like Thimphu, the city of Neuss is suffering from a great housing shortage and surrounding farmland is the only land left to develop. Located in the Rhine region of Germany, Neuss' jobs have attracted a growing population, which has resulted in a lack of housing. Simultaneously, there is a "growing awareness of the need for human living conditions: pollution free, green environments, safe and healthy for both body and spirit."<sup>53</sup> In addition, the municipality did not have time to wait for landowners to sell their land and they needed a method to finance land acquisition. Focused on designing environmentally sensitive neighborhoods for people with diverse social economic backgrounds, the city of Neuss faced challenges very similar to those in Thimphu.

### *Catalysts:*

The severe housing shortage that has resulted from the increased population in Neuss required immediate attention. The city government responded by planning a new housing development, called Allerheiligen, south of the city. Because this area was previously used for farmland, the project required sensitivity towards the communities living and working on this land and the landscape ecology.

### *Planning, Design, and Development:*

Using 160 hectares of land, the city planned to develop 6,500 residences, commercial services, and schools. The planners envisioned the development to provide housing and commercial services within

a natural setting. The city focused on methods to reduce long-term traffic problems and planned for a commuter train station at its center. Along with housing, the new development was to provide 700 new jobs, provide a “park and ride” area with 2000 parking spaces, and a ring road to divert traffic outside of the center.

To determine the best planning approach, three design schematics were produced to identify the positive and negative aspects of various design approaches. They each offered different housing types, public transportation and traffic systems, and assigned land use differently. After much discussion within the government, one solution was chosen. The government then reviewed this plan with the residents and received feedback. The strategy chosen for the housing design related to human proportion and character with a variety of building sizes. Multiple building types were designed to serve the diverse needs of large families, single parents, disabled persons, elderly, and low income families. Multi-story buildings using low energy heating systems and “ecological construction” techniques make the development sustainable. Clustered together, the houses leave space open for large landscaped areas that double as soil remediation and water filtration beds. Landscaped bus lanes, bicycle paths, and pedestrian footpaths will connect the residential areas to the commercial and social service zones so cars and traffic do not dominate the site.

The area’s water systems, wind patterns, natural vegetation and ecosystem were studied to avoid ecological damage. A commission was formed to undertake an ecological analysis of the farmland to study the development’s potential ecological impact on the landscape, thus determining what type of housing could be constructed with minimal harm. One area with lowland meadows and a stream was determined to be especially sensitive as the groundwater source was just below the surface. In response, the natural course of the stream was restored and the land will be brought back into its natural state. This area will serve as filtration system and recreational area for residents. The study of the wind patterns provided the designers with knowledge of a cool air corridor. They designed around this to provide the development with natural air circulation paths. Additional landscaping throughout the development will be maintained to keep the ecosystem healthy.

Another study to determine efficient energy use in the housing construction was underway at the time of the case study analysis. This intended to explore the potential of heating buildings using the warmth of outside air. The government of Neuss paid special attention to the treatment of rainwater, recognizing it and other sources of freshwater as an important resource. Rather than treating it as sewage, it will infiltrate back into the ground through collection pools and water

gardens to maintain a constant ground water source. Water runoff from hard surfaces and roads will be directed into sand flats that are designed to filter out pollutants before contaminating the ground water or the streams and canals that eventually lead into the river. Water that has filtered through the sand flats will then flow into drainage ponds that are integrated into the natural and recreational landscape.

### *Management:*

The city was not able to use their conventional approach at development, which entails each landowner selling their own land to the developer. They needed to use an innovative financing approach. The land was assigned a “land influenced by city planning” rate which made it affordable for the city. The landowner makes a profit as the rate for land is converted from farmland to buildable land. In addition, the community at large benefits because the profit is reinvested in that specific community, rather than the general municipal funds. The city government and the landowners met to discuss the deal at great length after which time they all agree to sell.

The city organized a project team responsible for the coordination of all aspects of the project including the time schedule to ensure that individual projects are completed on time without interfering with the success of others. An additional team was formed to serve as the liaisons between the politicians, developers, and administrators. The team reports to the applicable department in the city government for each phase of development. The commission and the teams are dedicated to goal-oriented and effective project management. In addition, to ensure the project’s success, they had to “transform public concern... into a willingness to cooperate and actively participate in the planning process.”<sup>54</sup> To encourage community support, an on-site information office was set up. They also facilitated public meetings and open discussions which made a “visible change in [residents and neighbors’] attitude toward the project.”<sup>55</sup>

### *Lessons:*

Intended not to repeat the mistakes of the 1960s and 70s, Neuss made every effort to make the project successful by not only focusing on the housing crisis at hand, but providing ecological, economic, and social benefits to the community at large.

The new community of Allerheiligen benefited from the profits of the land finance method by being able to reinvest it into the construction of elementary schools and a community center. These buildings would have added millions of dollars to the city government’s budget, but because it came directly from the profits of the land

conversion, their expenses were much less.

### *Applications to Bhutan:*

The scarcity of buildable land in the city of Neuss, as in Thimphu, required the city to develop farmland into housing. Their efforts at developing this natural and agricultural resource with specific sensitivity to its ecological conditions are directly applicable to the Thimphu valley. While the areas reserved for open space in Allerheiligen were used primarily for recreational use, such space in the Thimphu valley could continue to be used as rice paddies. This could provide supplemental income to those farmers still interested in farming, and serve as a historical reminder to the younger generations about the importance of rice cultivation in an increasingly urbanizing world.

## **Summary of Precedents**

All of the cases demonstrate the applicability of at least two of the six guiding development principles in multiple regional contexts. While the cases range from developed to developing countries, large cities to secluded farmland, Eastern to Western cultures, they have been able to adapt the principles to their distinct qualities. Building off the uniqueness of each site, these cases show how effective sensitive development can improve the physical, environmental and economic status of a region. Thimphu, and Bhutan at large, can adapt these same six principles to guide their development. The matrix and synthesis of the precedents' achieved goals that follow help to summarize the positive outcomes of each case. The following chapter will further develop how each principle can be applied directly to Thimphu, offering mechanisms and to make the kingdom's goals possible.

## **The Precedents Incorporated the following Effective Strategies:**

- Involved residents in the decision-making process (regarding relocation, land acquisition, and urban development plans)
- Designed homes to meet the diverse needs of occupants (for example, elderly, families, singles, disabled, and low income)
- Found the cultural and environmental value in preserving rice paddies
- Strove to find ways that farming preservation could directly improve the quality of life and livelihood for farmers
- Valued traditional settlement patterns as guides for new development to facilitate social support networks, economic

- benefits, and site responsive living environments.
- Created an official institutional body to specifically address environmental sensitive design and development
  - Provided officers and community members with experience and skills that can be applied in other regions of the country
  - Utilized creative financing that redistributed, rather than increasing taxes to support development costs
  - Improved local economy through environmentally-sensitive development
  - Reinvested development profits in the specific area affected by that development
  - Designed water and site sensitive housing with lots that responded to the existing contours and site conditions and preserved open space that was less costly on a per lot basis
  - Studied wind patterns, drainage flow, the sun path to reduce inefficient building design and allow for low energy heating systems
  - Addressed quality of natural water body issues by assuming responsibility for development's effect on region
  - Preserved environmentally sensitive areas like riparian zones, river banks, and wetlands
  - Used site responsive design to treat runoff, drainage and sewage onsite
  - Designed environmental remediation areas to double as recreation space

### The Precedents' Application of the Six Development Principles

	1. Recognized Value of Agricultural Land Use	2. Valued undeveloped land	3. Designed with site sensitive techniques	4. Found economic value in environmentally-sensitive design	5. Controlled Runoff and erosion	6. Involved community participation
Chengdu, China		X	X	X	X	X
Perth, Australia		X	X	X	X	X
Ifugao, the Philippines	X	X			X	X
Bangalore, India		X	X			X
Neuss, Germany	X	X	X	X	X	X

## End Notes

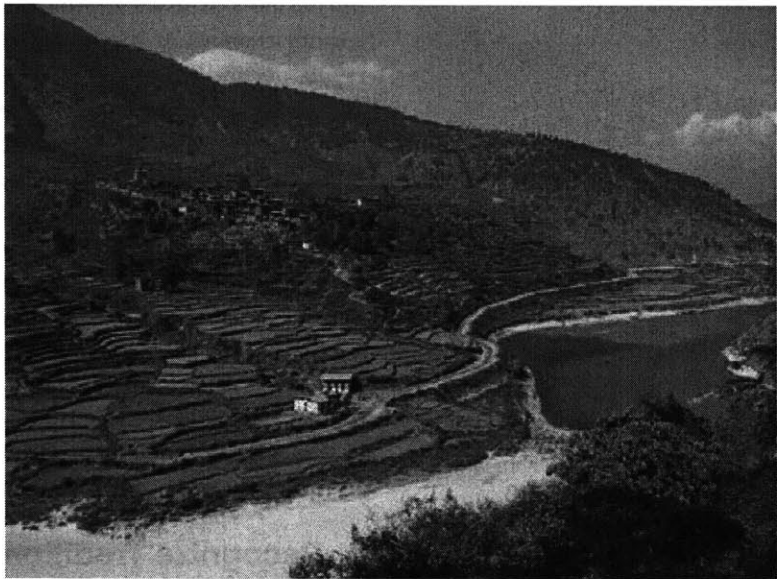
- <sup>1</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 2.
- <sup>2</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 3.
- <sup>3</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 4.
- <sup>4</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 7.
- <sup>5</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 4.
- <sup>6</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 4.
- <sup>7</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 8.
- <sup>8</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 8.
- <sup>9</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 8.
- <sup>10</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 6.
- <sup>11</sup> Comprehensive Revitalization of Urban Settlements in Chengdu, China, Best Practices Database, 6.
- <sup>12</sup> Hedgcock, 114.
- <sup>13</sup> Hedgcock, 115.
- <sup>14</sup> Hedgcock, 116.
- <sup>15</sup> Hedgcock, 116.
- <sup>16</sup> Hedgcock, 116.
- <sup>17</sup> Hedgcock, 116.
- <sup>18</sup> Hedgcock, 116, 117, 118.
- <sup>19</sup> Hedgcock, 117.
- <sup>20</sup> Hedgcock, 114.
- <sup>21</sup> Hedgcock, 116.
- <sup>22</sup> Hedgcock, 118.
- <sup>23</sup> [www.ncca.gov.ph/philippinecultures/peoples&traditionalarts/northern](http://www.ncca.gov.ph/philippinecultures/peoples&traditionalarts/northern)
- <sup>24</sup> Dulawan, 1.
- <sup>25</sup> <http://www.asiarice.org/sections/whatsnew/philippines46.html>
- <sup>26</sup> <http://www.asiarice.org/sections/whatsnew/philippines46.html>
- <sup>27</sup> <http://www.asiarice.org/sections/whatsnew/philippines47.html>
- <sup>28</sup> <http://www.asiarice.org/sections/whatsnew/philippines46.html>
- <sup>29</sup> <http://www.unesco.org/whc/news/helsinki2.htm>
- <sup>30</sup> <http://www.unesco.org/whc/archive/repcomx99.htm#sc722>
- <sup>31</sup> <http://www.asiarice.org/sections/whatsnew/philippines37.html>
- <sup>32</sup> <http://www.unesco.org/whc/archive/repcomx99.htm#sc722>
- <sup>33</sup> <http://www.unesco.org/whc/archive/repcomx99.htm#sc722>
- <sup>34</sup> <http://www.asiarice.org/sections/whatsnew/philippines37.html>
- <sup>35</sup> <http://www.asiarice.org/sections/whatsnew/philippines46.html>
- <sup>36</sup> <http://www.asiarice.org/sections/whatsnew/philippines47.html>
- <sup>37</sup> <http://www.asiarice.org/sections/whatsnew/philippines47.html>
- <sup>38</sup> <http://www.unesco.org/whc/archive/repcomx99.htm#sc722>
- <sup>39</sup> Babu and Kuttaiah, 6.
- <sup>40</sup> Babu and Kuttaiah, 6.
- <sup>41</sup> Babu and Kuttaiah, 3.
- <sup>42</sup> Babu and Kuttaiah, 3.
- <sup>43</sup> Babu and Kuttaiah, 3.
- <sup>44</sup> Babu and Kuttaiah, 9.
- <sup>45</sup> Babu and Kuttaiah, 9.
- <sup>46</sup> Babu and Kuttaiah, 9.

- <sup>47</sup> Babu and Kuttaiah, 9.
- <sup>48</sup> Babu and Kuttaiah, 12.
- <sup>49</sup> Babu and Kuttaiah, 11.
- <sup>50</sup> Babu and Kuttaiah, 5.
- <sup>51</sup> Babu and Kuttaiah, 5.
- <sup>52</sup> Babu and Kuttaiah, 6.
- <sup>53</sup> Environment friendly urban development in Neuss-Allerheiligen, Best Practices Database, 1
- <sup>54</sup> Environment friendly urban development in Neuss-Allerheiligen, Best Practices Database, 6.
- <sup>55</sup> Environment friendly urban development in Neuss-Allerheiligen, Best Practices Database, 6.



# **Chapter Five:**

## *Sensitive Development Approaches Applied to Thimphu*



*“The past is still visible but we must create incentives so that it remains prominent.”*

Sonam Phuntsho, Center for Bhutan Studies

Bhutan’s current stage of urbanization and modernization has pressured the Royal Government to find ways to balance its urban growth requirements with the nation’s environmental and cultural preservation agendas. Despite the government’s dedication to maintaining a living cultural heritage, modern technology and development practices are disregarding the relevance of agricultural practice, traditional settlement patterns and the historical relationship with the environment. In addition, the government currently lacks the coordination and capacity to enforce the breadth of regulations related to the environment, culture, design, and development. As a result, throughout the Thimphu valley, community members, private developers and government officials express the sentiment that it is impossible to stop people from developing their land despite the valley-wide moratorium. Landowners feel a sense of urgency to maximize and economize their land value. In turn, adhoc development continues to threaten the cultural and natural landscape throughout the valley.

As is the case in the United States and most other countries, “to replace the business-as-usual approach with environmental responsibility will require changes in the codes, regulations, habits, and prejudices of regulatory and political officials.”<sup>1</sup> While Bhutan’s current regulations and goals are far more progressive than most nations, the realities of urbanization challenge their successful implementation. Therefore, the following analysis describes how specific recommendations can be accommodated in Thimphu’s plans for development, assuming the government is willing to adjust their business-as-usual approach. Rather than presenting idealized goals that are unattainable, this chapter aims to offer practical implementation strategies that have been used in the international precedents and elsewhere throughout Asia. The following recommended incentives and mechanisms can help resolve the problematic debates about land use, land acquisition and compensation, sensitive development, and citizen participation. They are grouped according to each of the six development principles.

### **Recognize Traditional Sources of Livelihood as an Integral Part of Bhutanese History and Culture:**

*Include traditional farming in the discussion and planning of a living cultural heritage. (As exemplified in the precedents in Ifugao and Neuss)*

Asian countries have historically depended on rice paddies as the source of their agricultural income. The Asia Rice Foundation emphasizes that the paddies are “vital to the life support system of the people.”<sup>2</sup>

This statement holds true in Bhutan where 85-94% (depending on the source) of the population still is engaged in farming or livestock rearing.<sup>3</sup> Yet, those who continue to depend on rice production for their livelihood have nothing to gain by continuing their families' tradition. Their land's value immediately increases in economic value once it is within the municipal boundaries and can be developed. Development offers immediate, yet unsustainable short-term economic gain. Meanwhile, an increasing number of Bhutan's government officials consider rice farming a labor intensive and unproductive way of life, irrelevant to the Bhutanese identity. There is an assumption that Bhutan can continue to import its rice from India and other countries, though this does not adhere to the kingdom's self sufficient agenda. The following recommendations can help alleviate the problem.

### **Provide farmers with technical support**

With the changes that modernization brings, the traditional farming techniques that have sustained the Bhutanese farmers for generations are no longer enough to support their farms' economic viability and productivity levels. Thus, they are in need of technical programs that offer marketing and farming techniques.

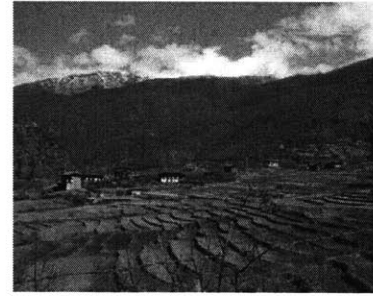
One example of this is in Jiangzi, China, where similar challenges to farming are being experienced. An agricultural modernization project has been organized to provide farmers with the support they need to maintain their farms as a viable source of income.<sup>4</sup> The services include:

1. Promotion of quality standards in farm production with special focus on irrigation and drainage systems
2. A market system development component that gives marketing advice to farmers and funding for small enterprises
3. Training for farmers to learn effective farm monitoring and management techniques<sup>5</sup>

Such a program could be instituted for the farmers in and around the Thimphu valley. After its initial year of development, the program could be expanded to other regions throughout the nation.

### **Offer farmers debt subsidies**

Often the changes in a globalizing economy hurt farmers most. In order to keep up with the rising prices of supplies and increased taxes, farmers are forced to borrow money and become locked into a cycle of dependence. To avoid this pattern, the Royal Government could offer farmers temporary subsidies that allow them to regain their financial independence.



*The farmers in this traditional village in the valley north of Thimphu continue to farm for their main source of income. The farmhouses are arranged linearly along footpaths, preserving the expanse of land for rice paddies.*

Recently in South Korea, the President responded to rice farmers protests against policies that were making farming impossible with a promise “to encourage farmers to continue rice farming.”<sup>6</sup> He pledged to increase subsidies and decrease interest loans for rice farmers to “make the utmost effort to stabilize farmland prices.”<sup>7</sup> Similarly in Thailand, a main component of the government’s development policy for the next ten years is agricultural restructuring and reform. Recognizing that one half of the Thai population is dependant on agriculture, the government developed a plan to “give farmers a respite from their debt, new technology to improve production and skills training to help raise the value of their produce.”<sup>8</sup> The program involved a “three year suspension of interest and principal payments, with the aim of giving farmers breathing space to re-invest in their farms.”<sup>9</sup> It has been effective in educating farmers about new marketing, financial management, technology, and organic cultivation techniques. Farmers who have participated in the program have been able to get out of debt and invest in a second paddy crop, and thus increase their revenues.<sup>10</sup> Such a program could benefit Bhutanese farmers and especially those with limited resources that prevent investment in a second paddy crop.

### **Encourage farmers to diversify their incomes**

Although rice is the main crop on which most farmers are dependent, small steps can be taken to allow individual farmers to broaden their income pool.

The king of Thailand has pushed programs to encourage farmers to diversify their income with other small businesses or types of cultivation.<sup>11</sup> The program has paid off for Thai farmers who have divided their land among fruit and vegetable gardens, chicken pens, fish ponds and rice paddies. Farmers are no longer dependent on the production of one crop. By using sustainable and self-sufficient farming techniques like solar panels and windmills to run water pumps, their transition has been smooth. After some training and instruction from technical assistants, one farmer describes how his commitment to the sustainable project improved his economic position:

He dug a fish pond which collected rain water, filled it with fish and planted fruit trees around its edge. The water nourished his rice field. Chicken droppings fed the fish and fertilised the land. He planted a wide variety of vegetables. Now he has enough surplus to sell to the market, his income has tripled, he has extended his home, bought a pick-up truck, a motorbike and a TV.<sup>12</sup>

These strategies are being used throughout Asia to support and return life to an age-old occupation. The financial investment needed to implement them is minimal compared to the improvements made to

the agricultural market overall. Agricultural practice does not have to be viewed in conflict with modernization. It should be recognized as a valuable aspect of Bhutan's past, present and future.

### **Recognize the ethics of self-sufficiency**

From a moral perspective, the dependence on other nations for crop importation contradicts Bhutan's agenda of self-sufficiency. It takes advantage of other countries' apathy towards sustainability in that the Royal Government accepts that Bhutan can benefit from other countries exploitation of their resources.

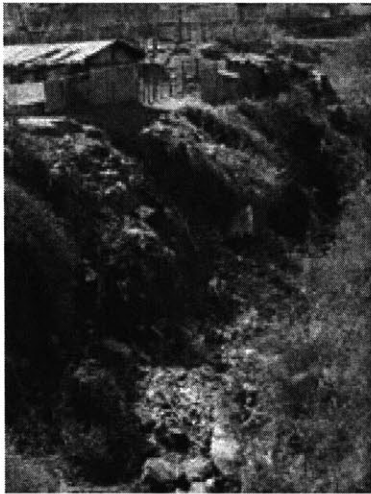
The proactive approach in preserving the environmental qualities of this cultural landscape is described by the Asia Rice Foundation. "The [rice paddies] should be nurtured as an ecosystem by continually designing and implementing ways and means of bringing about their improved, sustainable productivity."<sup>13</sup> Rather than discounting the importance of agriculture in modern Bhutan, acknowledge the cultural significance, the progress towards a self-sufficient society, and the intricate ecological ecosystem that farming has offered and can continue to offer the Bhutanese way of life.

### **Value Undeveloped Land:**

*Recognize the value in the biodiversity, wildlife habitats, stormwater retention in environmentally sensitive areas, recreation space and farmland when determining what areas to leave undeveloped. (As exemplified in the precedents in, Chengdu, Perth, Ifugao, Bangalore and Neuss)*

Western societies have historically undervalued any land use that does not offer immediate, short-term economic benefits. To counteract this, progressive thinkers like Ian McHarg and Frederick Steiner have created evaluation systems that assign value to all land uses. The ecosystems and biodiversity that agricultural land maintains have both monetary and environmental value. This understanding is essential to realizing Bhutan's sustainable development.

Rather than viewing the flat terraces as areas void of economic productivity and ideal for development, know that they are rich in value. As in other Asian countries, the intricate ecosystems that are part of the rice paddies go unnoticed and undervalued in Bhutan. The paddies "improve the environment through [their] ability to conserve water, to sequester ecological pollutants, and to increase biological diversity."<sup>14</sup> Without them, the aquatic plants and animals that thrive in the water environment would "disappear from our environment." The destruction of these ecosystems, will in turn affect the species that rely on them for their survival.<sup>15</sup> To counteract this threat, the Asia Rice Foundation advises that "better appreciation by the population of the need for and importance of ricefields will ensure



*This image shows a typical workcamp (bagos) settlement perched directly above a steep embankment. Its location threatens to erode the riparian zone, and contaminate the soil and water with litter, solid waste, and other pollutants found in runoff. If development continues to occur along the banks of streams and rivers, the watershed is at risk.*

a better environment for future generations.”<sup>16</sup> Therefore, they caution that “land use must be critically evaluated and strictly enforced,” with policies to effectively maintain this form of biodiversity.<sup>17</sup> While there is some acknowledgement of the important biodiversity that agricultural wetlands offer Bhutan in the Biodiversity Action Plan, it is not acknowledged in the current development trends. Rather, in today’s mounting development pressure, rice paddies are considered replaceable. Yet, the Asia Rice Foundation warns that this sentiment is growing throughout other Asian countries, decreasing the availability of Asian grown rice.

### **Protect environmentally sensitive zones**

In addition to agricultural land, sensitive areas such as riparian zones and hillsides with slopes greater than 30- 45 degrees should be valued as undeveloped land. Bhutan’s increasing land values and housing crisis have resulted in an increased number of *bagos* (squatter) settlements. As in other developing countries, these settlements are often built on environmentally sensitive areas like riverbanks or steep hillsides, which further disrupt the harmony between residents and the landscape. To effectively plan for the preservation and protection of these riparian zones, the communities living in the temporary settlements and workcamps need to be brought into the formal real estate market. Both the people and the environment affected by these settlements require sensitive attention. The successful relocation of families cannot be done without their active involvement in the decision making process. If individuals are not recognized as worthy of respect and inclusion in mainstream society, they cannot recognize the worth of their surrounding environment. Their exclusion in the planning process leads to apathy and contradicts the fundamentals of Buddhist beliefs to respect life in all forms.

This aspect of the process cannot be under stressed. Bhutan at large will benefit if all its community members see the value in their rules, regulation and cultural procedures. This process has helped Chengdu and other developing countries realize their goals. In Brazil, the slum upgrading process improved when:

The public works and the improvements related with [upgrading and remediation] interventions are realised directly by the municipality, either through the contracting of construction firms, through mutual self help groups, through a combination of construction firms, municipal management and mutual self help groups, or finally through outright self management by the community itself.<sup>18</sup>

## **Assign economic, cultural, and environmental value to land uses**

Ian McHarg determined a method of ranking or giving value to all systems (even those without a price value) including natural, social, and cultural aspects. Every development project has costs and benefits. By assigning each one a value, Bhutan's development teams can conduct a quantitative analysis of the project. To best describe this method, McHarg evaluated the positive and negative economic effects of a highway project. In his analysis he included the following factors:

1. Durability of underlying rock for construction above
2. Areas with susceptibility to natural disasters
3. Soils susceptible to erosion
4. Water quantity and quality
5. Drainage
6. Types of species
7. Wildlife habitat
8. Scenic quality
9. The importance of historic buildings <sup>19</sup>

Once all the factors are identified, evaluate and rank the aesthetic, natural resource and social values. "Thus if destruction or despoilation of existing social values were to be caused by proposed highway alignment, that alignment value would be decreased by the amount of the social costs. Therefore we can conclude that any alignment that transects areas of high social values and also incurs penalties in heightened construction costs will represent a maximum social-cost solution."<sup>20</sup> This process of analysis can be taught to communities directly so they can directly engage in their village planning efforts. Technical expertise can be helpful in guiding the process, but government staff does not need to be heavily burdened.

## **Formalize the land acquisition and compensation process**

Even when the value of a particular land use is recognized in Bhutan, development is still revered as ideal. One argument against valuing landscapes for their wildlife habitat, rich soil, or adjacency to a water source is that the current landowners will suffer economically if they are prevented from developing. Because the preservation of undeveloped land usually requires land acquisition by the government and compensation, those who are not allowed to build on their land consider themselves cheated out of their lands' full economic value. How to resolve this predicament is under intense debate in Thimphu. The following questions arise:

1. How can the government afford to compensate all the landowners?
2. How can landowners accept the compensation they receive when

it can be as low as one-third the value of their property?

3. Why are some landowners able to avoid acquisition because they know higher officials who can bend the rules or make exceptions for them?

One strategy that is being discussed and applied in test cases throughout the nation is land pooling. This strategy, also known as land consolidation, readjustment, replotting, or redistribution, is a method of “consolidating separate landholdings for their unified subdivision for the planned pattern of urban land uses.”<sup>21</sup> It is gaining popularity among landowners because it does not require displacement. But it does require all landowners within a target area to give up to 30% of their land for the provision of public roads and open space. Government officials encourage this method because the land redistribution does not require government money to purchase the land. This way, the government and private landowners split the costs and returns of the planned neighborhood. Despite the momentum this approach is generating, not everyone is in favor of it. Landowners who have access to existing roads and infrastructure, who are adamant about maintaining their lands’ traditional boundaries, or who find it unjust to demand the relinquishment of 30% of their land, stand in opposition.<sup>22</sup>

There is an international tendency to use land pooling to justify the reorganization of traditional settlement patterns into orthogonal grids which lack respect for the site’s environmental conditions and the traditional lifestyle in which people live and work. Land pooling does not need to turn the rich texture of existing villages and neighborhoods into monotonous blocks of identical plots. However, if used in combination with the other principles presented in this chapter, land pooling can help balance the financial burden and reduce the landowners’ pressure to develop at any cost before the plans are passed.

### **Make landowner rights transparent**

In Vietnam, the World Bank has begun a Poverty Reduction Project that erected a *Policy Framework for Compensation, Resettlement and Rehabilitation of Project Affected Persons*.<sup>23</sup> In this framework landowners rights are clearly stated:

Compensation of lost agricultural land will be through provision of “land for land” arrangements of equal productive capacity of the lost land and satisfactory to the PAPs [Project Affected Persons].

1. PAPs will be compensated for the loss of standing crops and fruit or industrial trees at market price. Productive trees will be compensated at replacement cost.
2. PAPs whose land is temporarily taken by the works

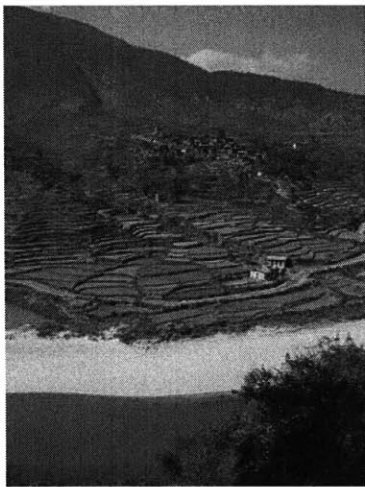
- under the Project will be compensated for their loss of income, standing crops and for the cost of soil restoration and damaged infrastructure based on the temporarily impacted period, if this period is more than two years, the impact is to be considered permanent.
3. The land for compensation is to be provided from the community land bank.
  4. The mechanism for compensation loss of residential land and structures will be: (1) the provision of replacement residential land of equivalent size, satisfactory to the PAPs; and (2) cash compensation reflecting full replacement cost of the structures, without deduction for depreciation or salvage materials.<sup>24</sup>

These policies help clarify what the standard compensation procedure is for all landowners. In Bhutan, landowners who are affected by environmental zones and conservation requirements should be compensated by obtaining property tax deductions, or transferable development rights. If such legislation was made transparent to the landowners throughout the Thimphu valley, the rapid development rush would cease because people would feel less threatened that their livelihood and land would be plucked from their hands.

### **Include landowners in the land acquisition decision-making process**

Where land acquisition was required in Jiangzi, China, farmers participate directly in the acquisition negotiation process. To do this, an Agricultural Modernization Project team organizes visits to the site to meet with those affected and “jointly evaluate the sub-project and negotiate quantities of the occupied land, compensation criteria, and methods for relocation, and sign agreement only after all parties involved agree.”<sup>25</sup> In addition, each development project’s team is responsible for making the farmers’ rights public information and for explaining the process through which they can express their grievances. The process allows dissatisfied landowners to voice their complaints at a local committee. The committee takes these concerns to the project team to negotiate directly. If the issue cannot be resolved at this level, it is then taken to court.<sup>26</sup>

And yet another example of successful mechanism is in Northern Vietnam, where displaced people are encouraged to be even more involved. They are invited to “participate throughout the various stages of the planning and implementation of the partial or full [resettlement plan].”<sup>27</sup> The Vietnam project used a flow chart of the steps required for a successful land/property acquisition and compensation process (*See Appendix B*). While Bhutan could produce similar legislation, if it



*Just outside of Wangdue is a hillside cluster of farmhouses that make efficient use of the land. The dense cluster reinforces the natural site conditions, blends in with its surroundings and preserves the maximum amount of land for farmland.*

is not enforced by authorities and respected by citizens at large, the effort will be futile.

The desire for this involvement on both sides is necessary for it to be useful. The questions remain: Will Thimphu continue to develop the valley and farmland that currently remains outside the municipal boundary? Or will the government enforce urban growth boundaries that support the existing urban core and outlying villages? If value is not placed on the valley land which supports both human, animal and plant life with wildlife habitats, ecosystems, and natural drainage systems, then Thimphu is likely to continue to sprawl outward. If their value is understood, attention can be placed on the making the existing urban center more livable for current and future generations of Bhutanese.

### **Use Sensitive Development Techniques:**

*Respect the valley's environmental conditions by responding to the natural contours, drainage systems, and traditional settlement patterns in the planning and development of the valley. (As exemplified in the precedents in Chengdu, Perth, Bangalore, and Neuss)*

Urban development around the world has resulted in flooding, erosion, and pollution. In developed countries like the United States, the mainstream development community is only now “beginning to realize that it is more efficient to work in harmony with natural processes, emulating and incorporating their complex system architecture into [their] designs and technology.”<sup>28</sup> Bhutan has long since incorporated a more harmonious approach in its development strategies. As the country begins its initial stages of urban development, it has the opportunity to follow through with the sustainable agenda that has defined its culture and legislation over the decades. However, as described previously, new development is not adhering to traditional values and methods. Like countries everywhere, Bhutan has responded to modernization and technology by discounting some of its traditional methods that have been integral in shaping the way of life for generations. This tendency is showing up in Thimphu’s current development projects. Rather than disregarding the traditions that used rational, thought out site configuration and development methods, modern technology can be used in conjunction with traditional settlement patterns to strengthen and reinforce them. As Bhutan’s traditional settlement patterns used sensitive development techniques that responded to the natural landscape, so too should modern development. Some methods of achieving this follow.

## **Incorporate people and environment into the building and site design**

George Brewster, member of the Urban Land Institute's Environmentally Responsible Development Taskforce writes: "Environmentally responsible buildings must be sited with regard to energy conservation and efficiency (passive solar design), as well as with regard to the ecology of the site, neighboring buildings, and the community as a whole."<sup>29</sup> Traditional Bhutanese architecture and settlement configuration adhered to these goals. They can be realized in modern Bhutan, as they have in the past, in a number of ways:

- Let the valley's landscape serve as a cue for future development. Why not have the new development—all of it, not just secluded "heritage villages"—represent Bhutan's traditional planning heritage? This does not mean that all new development should be exact copies of the traditional structures and villages. Rather, traditional sensitivity to the environment can be enhanced through the exploration of modern technology and intelligence. The dominant perception that new construction has to follow Indian architectural standards is going to erase the Bhutanese identity, while disregarding Bhutan's unique natural resources that have been respected for generations. The country's Ninth Five Year plan recommends that housing needs be met through "traditional concepts of safer, decent, and climatically suitable housing."<sup>30</sup> By doing this, new housing should promote traditional architecture and adapt traditional materials in to modern styles to reduce the dependence on imported materials and labor.
- Link the construction of new buildings to the preservation of historical features and the preservation of the natural environment to retain a richer heritage. If the government buys a traditional farmhouse cluster with adjoining farmland and hires private developers to renovate the houses into livable dwellings, it can then rent or sell the homes to those who are eager to live in a traditional setting. This can prevent historical buildings from deteriorating or, on the other extreme, becoming tourist-driven museums.<sup>31</sup> In addition, incentives that recognize the value of traditional structures and make landowners *want* to maintain and *be able* to afford their own traditional homes will help preserve the living cultural heritage of Thimphu over time.
- Take advantage of existing historical resources by adapting old buildings into new, necessary uses. For example, an unoccupied traditional farmhouse can be converted into a village library or community center. This reuse would

provide individual villages with their own facilities, while celebrating the traditional form of architecture.

- Design buildings that respond to the environment with natural materials, colors, subtle roof forms, breaks in the streetfront, and elevation changes to avoid the common mistake that modern development has to look like identical boxes.

*See Appendix C for a list of Brewster's principles.*

### **Avoid generic suburban housing development**

Modern housing developments do not have to take the form of monotonous, western-influenced, suburban developments. New development can reflect the nature of the existing, but make more efficient use of space and existing resources, and result in environmentally sensitive settlements with the following steps:

- Infill within the existing urban core to make more efficient use of buildable land. Throughout the urban core of Thimphu, empty lots go underutilized. These areas should be considered the prime areas for development. They already benefit from city services and infrastructure. Their development can help improve the atmosphere of Thimphu as the capital city.
- Adapt the traditional village clusters to increase density. Define the common spaces within these older settlements as formal areas for communal use. Formalize existing land redistribution within extended families so that large lots that are no longer used for agricultural purposes, can be subdivided into individual lots so members of the extended family can build their own homes adjacent to their family members.
- Set lot lines and building footprints that respond to natural conditions so they minimize disruption of the paddy terraces, forestland, and water channels as traditional settlements often did. Modern technology and equipment should not be used as rationale to ignore a site's environmental conditions.

### **Cluster housing to make efficient use of space**

Clustered housing development preserves agricultural and natural land on the periphery and defines communal open space between the homes. "The cluster, like the house, is an entity made of many parts which form a mini-community."<sup>32</sup> The orientation of the houses around a common outdoor space can provide safe places for children to play and community gathering space. Known to be one of the most enduring forms of housing in both an urban and rural context, the



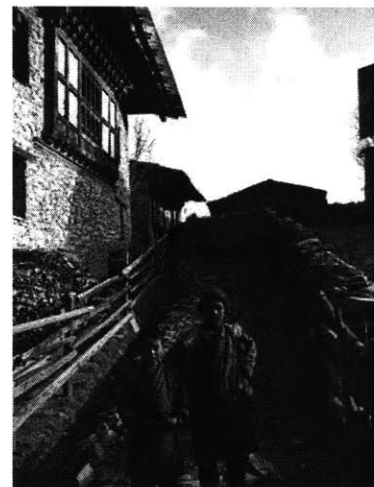
*Ura village, shown in the photographs to the left, has a distinct Bhutanese style. Constructed of stone and wood, the homes are laid out in an organic pattern that follows the slope of the land.*

*The village is characterized by a network of stone footpaths (shown below) which link the homes and their residents to one another.*

design of shared open spaces and their relationship with other housing developments, roads, services, natural landscape and farmland are critical to a cluster's success. Sensitively designed terraced construction can provide additional views, access to daylight, and privacy for residents. "The housing clusters themselves become landscape elements," as they reinforce the site conditions.<sup>33</sup>

Intelligent site planning can help maximize the quality of cluster housing and reduce the need for additional infrastructure and disruption to the landscape in the following ways:

- Maximize the number of common driveways within a development to reduce the total amount of hard surfaces and lessen the amount of disruption to natural systems.
- Cluster buildings, including the core community facilities, to reduce the need for extensive infrastructure, leaving designated sensitive areas untouched.
- Construct the built environment to relate to existing environmental conditions by constructing the floor level of buildings at least 1 foot above the flood plain. Smart planning today can prevent destruction for future generations.
- Implement protective covenants that require each residential project to submit building plans, topography maps, and tree surveys so that they are held accountable to comply with environmental regulations. Preserve as much of the terrain and vegetation as possible. This can ensure that existing vegetation remains intact or is replanted after construction.



## Conduct Thorough Site Analysis

As traditional Bhutanese settlements have demonstrated for generations, sensitive site analysis pays attention to the current land uses and that of adjacent sites. Identify the factors that influence a site and the potential development within that site including environmental and climate conditions, and adjacent circulation routes and their effects. For example, in Thimphu's southern valley, acknowledge the villages' existing homes, orchards, and farmland and its relationship to the existing highway, new expressway, and Wang Chu River. Given the site conditions analysis, determine what type of development they can support. This can be studied with a series of plans and sections that lay out a general massing configuration according to the site conditions and a site massing study to show how the proposed development relates to the site contours, wind patterns, sun orientation and drainage. (*See Appendix D*)

Such analysis is relevant to any site planning efforts and can be done best by communities themselves. It is useful in identifying sensitive areas, which can inform upcoming planning decisions. While technical expertise can help understand ecological conditions, it should not prevent citizens from conducting their own analysis. Yet as is the case with most modernizing countries, as Bhutan modernizes, traditional methods of analysis are considered outdated and worthless. As a result, less sensitive development is occurring at a faster rate than ever before in Thimphu.

As an example, the village of Lungtenphu, in the southern Thimphu valley, can serve as an ideal site to allow new housing development to preserve the cultural and architectural integrity of an existing village. Lungtenphu is comprised of a cluster of six traditional farmhouses, surrounding rice paddies and orchards. At the center of the cluster are the village mill, well and religious stupas for prayer. Unlike many of the villages, the landowners in Lungtenphu still live in the original homes and intend to maintain their farms and their lifestyle. The cluster sits midway down the valley, between the old highway, which runs along the valley wall, and the new expressway that is currently being constructed in the river basin. The combination of these factors makes Lungtenphu a practical site for the following schematic planning exercise.

In response to the site conditions and the development principles, a new development plan should maximize the preservation of agricultural land by clustering new housing around the existing village center. The housing (possibly comprised of variations of traditional single family homes, duplexes and town houses) arranged in close proximity to one another, can offer shared outdoor space that provide safe, communal gathering areas for kids and families while maintaining residents' privacy. The commercial zone should be located within

walking distance between the residential clusters to reduce the need and expense for extensive infrastructure and commutes. In addition, attention to common driveways, parking lots, open space and infrastructure can significantly reduce the cost of development. Clustered hillside development along the existing road can minimize the amount of new infrastructure and maximize the amount of preserved land for agriculture. Sensitive construction can uphold the soil's strength, while providing views and light access to each residence. A new local road could connect the old highway to the new expressway. All roads should be lined with trees and swales to limit the effects of noise and runoff on the residents' quality of life. Serving as a buffer zone between clustered development and providing farmers with an environmentally and culturally sustainable source of livelihood, the majority of the rice paddies can continue to be farmed as it has for generations and remain a prominent feature in the valley.

### **Foster new institutional relationships**

There are many aspects of management necessary to coordinate, maintain and finance these environmentally and culturally sensitive proposals. To do this a cultural heritage design committee could:

- Facilitate cooperation between governmental levels to ease the planning, designing, financing, and construction phases of development. The committee could work in association with the NCCA, DUDH, and TCC.
- Work closely with the local and state jurisdiction to improve communication. Regular contact can allow the developer to adjust the required width of roads and other similar requirements so that the site's natural contours and existing trees are preserved wherever possible. DUDH, TCC, and NEC would coordinate their plans.

All development, both the renovation of the old structures and new construction, will benefit everyone more if environmentally and culturally sensitive development techniques are used. These techniques increase the capacity of high-density use, allowing more land to remain as agricultural, forest, or conservation land, while maintaining a high quality of life. Rather than succumb to the political pressures that are beginning to transform Thimphu's natural and cultural landscape into an unrecognizable Bhutanese urban center, following culturally embedded development practices can make Thimphu the capital city of Bhutan.



*This construction site exemplifies the lack of care given to existing site conditions. Sensitive storage and disposal of construction material is necessary to uphold the country's commitment to the environment. This neglect affects adjacent sites, and the water quality of the region.*

## **Find Economic Value in Environmentally Sensitive Development:**

*Recognize the long-term, economic benefits of sustainable development projects when estimating the additional up front costs of the development. (As exemplified in the precedents in Chengdu, Perth, and Neuss)*

Environmentally sensitive design can achieve more profitable development because these unconventional strategies can yield more lots, less wasted space, and creative resource and waste management systems. “Practicing environmentally responsible development can reduce real costs and create economic value in the form of long-term savings in energy and water consumption, recycling of building materials, increased safety, and reduced maintenance costs.”<sup>34</sup> Whereas low density, pre-planned subdevelopments of single family homes are more expensive to build, maintain and provide with infrastructure and services, higher density developments that make use of the natural site conditions are more efficient.<sup>35</sup> Some practical methods of achieving these goals follow.

### **Use creative financing strategies**

To make large projects realistic, new strategies to fund them must be developed. For example, create a Tax Increment Financing (TIF) District in which all tax revenues generated from private development are used to pay off the public development and construction costs. Or as in Neuss, Germany, reinvest profits from the development in the particular geographic area from which they were earned.

### **Encourage private development**

Construct development requirements that encourage private development to join the project in phases so the costs incurred by the government are manageable. Charles Benninger believes the government needs to set up a department that facilitates the building construction phase so private developers can design projects. The government could review and clear or reject the private projects in their first phase. He suggests a bidding process that would choose three out of seven developers, all of whom made financial bids on the project. The developer that returns with the most reasonable bid would be granted the job. This could help the problem with the housing shortage because it would take the burden off the government.<sup>36</sup>

### **Split development into manageable phases**

Split large, unmanageable, long-winded projects between multiple partners to meet the objectives of regulatory departments and shorten the time for completion. Partners should include: the Planning Commission, the NEC, the DUDH, and TCC and local private developers. Even in 1987, Karan recognized that “the reconciliation of economic growth with the need to maintain environmental integrity

cannot be achieved by individual sectoral planning or by isolated measures undertaken at the local level. A comprehensive approach...which links environmental and socioeconomic factors, could be employed in both national and district level planning and in the development of rural areas.”<sup>37</sup> For example, the national government can provide farmers with incentives and subsidies, whereas the city can support the development. Also, allowing private developers who have experience in phases of development to control projects within the plan can make the process much faster and efficient. Bhutan’s Ninth Five Year plan, which takes effect later this year, also encourages public private partnerships “for planning and effective delivery of urban services.”<sup>38</sup>

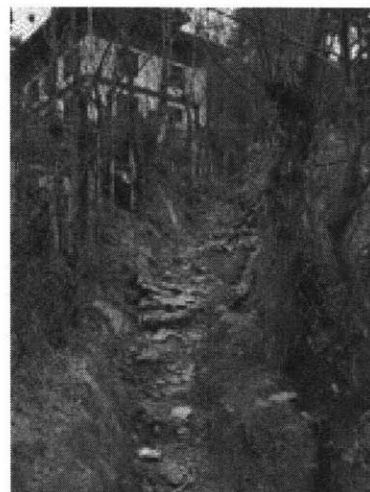
Coordination between partners will require dedication on the part of all parties, but it is necessary for sustainable and efficient development. “If we design environmentally responsible communities in which people are less stressed and more at ease and in which buildings last longer and cost less to own, we will find higher rates of employee productivity, lower building operating expenses, higher resale prices, and faster home sales rates.”<sup>39</sup> By using the unique quality of a landscape to market itself, a project can draw on the site features, community identity and its relationship to the environment, rather than assume that globalized, generic amenities are what residents need.

### **Control and Treat Runoff:**

*Minimize the effect of water runoff by maximizing onsite evaporation, filtration, and nutrient absorption and preventing any storm water from directly discharging into creeks or water courses. (As exemplified in the precedents in Chengdu, Perth, Ifugao and Neuss)*

In addition to its acclaimed cultural and environmental resources, Bhutan is fortunate to have a terraced valley. Landscaped terraces and hydroseeded slopes are effective methods to prevent erosion that results from development. The rice paddies throughout the valley serve as percolation beds for water pollutants and slow the flow of runoff. If they were to be removed entirely, erosion, runoff and flooding problems are bound to arise. Additional development will increase the amount of impervious surfaces throughout the valley, preventing rainwater from filtering into the soil. As a result, the intensity of water runoff will increase, affect the entire watershed and possibly resulting in flooding. Karan described such risks in the lower valley and the threat of floods during the monsoon season:

Deforested and disturbed slopes cannot regulate or slow the rapid runoff of rainwater. Rivers rise quickly, resulting in flooding and silting, which destroys crops and property in the lowlands. When watersheds are stripped of their forest and



*This natural drainage stream, and others throughout the valley, are cluttered with visible litter. Pollutants in water runoff are not as easily detected. Continued disregard will cause fresh water, as well as ground water contamination.*

vegetative covers, droughts can occur, the soil loses its ability to absorb and hold water which is later released into springs and streams.<sup>40</sup>

Thus, if the terraces are left intact to slow and filter the water and nature reserves are created around streams and rivers, together they can prevent pollutant buildup and flooding risks. “Site development and engineering practices will need to be adjusted to allow narrower streets, encourage the use of pervious surfaces, and manage stormwater in ways that more closely mimic the natural runoff of sites, while discouraging mass grading.”<sup>41</sup> These practices not only maintain, and in some cases improve, the environmental conditions of a site, but they also save money in construction, management, and future remediation costs. The goals can be met with the following recommendations:

### **Minimize grading wherever possible**

Because “grading will do maximum damage to a minimum amount of space,” concentrate development and plan to minimize its impact on the landscape.<sup>42</sup> The more land that is razed, the more disruption to the natural ecosystem occurs. Ways to minimize impact are as follows:

- Build parallel or perpendicular to the contours, depending on the site conditions.
- Avoid constructing large building footprints that require flat land. Smaller units can adapt to variations in slope and step down the hill without the need for massive grading. This does not mean that houses have to be smaller, but rather they can build upward, taking advantage of Bhutan’s unique views and landscape at the same time.
- Use stilt or split-level construction, rather than large slab foundations. Such construction can allow the natural vegetation to remain intact, maintaining the soil’s strength. It requires less removal of trees, bush and rock outcropping is necessary. The rich quality of the natural environment surrounding the development can benefit the residents tremendously, while reducing the amount of erosion and runoff usually caused by development. For example, traditional Bhutanese architecture could be adapted to use split-level or pier-footing construction designed with seismic diagonal bracing. Terraced or split-level housing does not add much cost to very large or very small projects, and they can offer much more in the maintenance of natural site qualities. The short and long term benefits of construction must be evaluated, including the costs to remove and replace landscaping, the impact on the greater ecological processes,

and the costs to the adjacent properties and the municipality.<sup>43</sup>

- Lay out the road system to minimize the amount of disruption on natural environment by making use of connecting routes and width of roadways.

### **Pay attention to landscaping**

A site's natural landscaping does much more than "make it pretty." Landscaping often serves multiple purposes to prevent erosion and runoff.

- Transplant native plants after construction if their original habitat is no long suitable for planting.
- Keep the indigenous trees and vegetation and their roots intact as they help stabilize the soil and prevent erosion and increase runoff filtration.
- Allow additional landscaping to complement rather than replace existing native plants.

### **Use sensitive drainage systems**

Rather than encouraging all waste and runoff to leave the site through extensive infrastructure systems, it makes more ecological and financial sense to treat it onsite in the form of retention ponds or swales.

- Utilize onsite existing environmental conditions such as shallow basins or natural drainage ways to create storm water retention areas that can will eliminate or reduce the need for cut and fill and therefore the amount of erosion and sedimentation.
- Shape drainage system according to vegetation and wetlands so open space can serve as space for drainage, buffer zones, and pedestrian and recreation areas. In keeping with tradition, allow the riparian zones to serve as locations for footpaths. They are well-vegetated to function as runoff control and buffer zones for noise and wind. The footpaths link the residential clusters and the village center to the surrounding farmland, roads, river and services. As envisioned in the structure plan, an open space corridor along the river can connect each village to one another.
- Use native grasses and aquatic plant species that naturally filter out pollutants from the water as it is absorbed into groundwater on all development sites. This method could save Thimphu from facing major water contamination and flooding problems in the future.
- Think of surrounding land uses when determining the best system for dealing with storm water or waste—one person's



*Traditional irrigation streams, such as this one, are planted with trees on both sides. Their roots stabilize the soil and prevent erosion. However, natural vegetation can help filter runoff before it reaches the irrigation stream and flows into the river.*

waste is another's input. This approach was demonstrated in previous section's example of Thai farmers who diversified their own incomes and used the waste of one production as the input for the other.

- Careful consideration must be paid to the placement of the runoff collection. There must be absorption areas throughout the site to avoid erosion. Multiple locations that are composed of gravelly soils and mature vegetation will most effectively treat water runoff.<sup>44</sup>

As discussed in the Perth example, responding to the natural site conditions as environmental resources, rather than as problems to be solved with engineering techniques, can benefit Bhutan's development strategy. Less razing and sensitive attention to landscaping and drainage can reduce erosion and runoff on and off the site. Regions throughout Europe and the Americas are utilizing these natural processes to avoid and, unfortunately in many cases, remediate the environmental hazards that have detrimental effects on quality of life. The Royal Government has the opportunity to prevent the problem from reaching dangerous levels in Bhutan.

### **Make Citizen Participation a Priority:**

*Involve citizens in all phases of development to ensure a successful end product. (As exemplified in the precedents in Chengdu, Perth, Ifugao, Bangalore and Neuss)*

As introduced in the previous discussion on land acquisition, community support is vital to a project's success. If implementation of government regulations and plans is to be possible, development regulations and physical planning have to be shaped by citizen input. One of the main challenges that DUDH, TCC and NEC face today is how to gain the support and compliance of Thimphu residents. Currently, much of TCC's time is spent negotiating with individual landowners about land acquisition and land use. This is caused by top-down planning processes that do not involve the communities in the decision making process.

### **Citizen participation can help preserve the cultural and natural landscapes**

One strategy that is gaining momentum and achieving successful results worldwide is that which recognizes the importance of community participation in preserving the cultural and natural landscape. This approach is not only sensible because the communities have had intimate knowledge of the land for generations, but also because it provides direct benefits to the communities in the form of economic and employment opportunities.<sup>45</sup> Such participation "aims to make the local communities themselves the custodians and protectors of

their own communities” and thereby reduces the ‘us vs. them’ mentality that often prevents preservation efforts from being successfully implemented.<sup>46</sup>

When the planning for the Sixth Five Year Plan was underway a major component was to decentralize the government in effort to better serve local communities. Karan suggested that if the government wanted to meet the “urgent needs of the population,” it needed to use a sustainable development strategy that involved the people in the development process.<sup>47</sup> It is not clear whether attempts at this were successful, but considering that fifteen years later, the Ninth Five Year Plan is being referred to as “The People’s Plan” makes it appear that now the Royal Government is serious about citizen participation.

### **Define citizen participation**

“Participation” is not equivalent to feedback after decisions have been made. Often governments say community participation is occurring when in reality only a handful of hand-picked residents are presented with a new plan. A community in Indonesia that has engaged individuals in the envisioning and decision-making process yielded positive results. They found that “a more open and inclusive process of establishing environmental priorities can help not only to ensure that those priorities are the right ones, but also to broaden the consensus among the various stakeholders in favor of those priorities. The spirit of cooperation engendered by that participation also provides the foundation for more effective collaboration, and thus can help to mobilize the additional talents, energy, skills and financial resources needed to achieve those goals.”<sup>48</sup> Such a process can bear a more equitable development process in Bhutan.

### **Engage the public**

Some ways to involve citizens in planning their own cities are as follows:

- Advisory boards that provide the forum for open discussions about development and environmental risks can involve citizens. The local boards can help facilitate the decision-making process and lead to solutions in which everyone has invested interest.<sup>49</sup> When these government and community derived regulations are not followed, the perpetrator will be fined and that income goes back into the community fund to pay for more community-driven projects.
- Ensure that citizen groups have regular involvement and have the means to be heard by the developer and government officials. Their knowledge of the site conditions and history is valuable information. Thus, their involvement can reduce cost increases and project changes in the long run.

- Give citizens voting rights on bond issues and regulation referendums.
- Allow citizen action groups to formulate alternative plans of development as this gets them directly involved in creating their community's physical space and provides pro-bono services for the developer (public or private) by offering new "outside the box" ideas about development.

### **Increase communication to ease implementation process**

In order to transform unenforceable and sometimes unreasonable regulations into realistic guidelines, communication with all stakeholders is necessary. Using real examples to discuss the possibilities for development can prevent consensus from being reached because most often stakeholders have already defined their position. Instead, Brewster suggests beginning the process by discussing new variations of building, neighborhood design and site planning to help build a communal vision. In Bhutan, these new models would be neither exact copies of the traditional Bhutanese examples, nor of Indian design and construction. They should be a hybrid of traditional features and modern technology.

Because so much of the environmental, cultural, and design regulations are developed by the government alone, they currently appear as a threat to private business and landowners. Citizens have little or no involvement in formulating the legislation, nor do they see the need for it. Thus they resist its implementation. If the private developers and residents were involved in the formulation of legislation, they would be encouraged to "find the most cost-effective way of accomplishing those goals."<sup>50</sup> This would reduce the amount of resistance to them and would cost the government less in implementation and enforcement.

### **Coordinate department agendas**

Currently in Thimphu, each government agency has different priorities and agenda and thus, the regulations of one are not always carried out by the others. Extremely detailed and explicit regulation is passed, yet upper management in various departments can grant variances for their own projects. They often do not have the capacity or desire to enforce the regulations on the developers and the landowners. But if citizens of Bhutan had an invested interest in the creation of their own city—if they were not merely the consultants, but helped shape the vision—then they would have less resistance to its creation. There would no longer be such a strain on government enforcement capabilities. This could solve multiple problems: the lack of community support, the immediate need for trained staff to enforce regulations,

and the lack of well thought-out, environmentally and culturally responsible development.

One way to help aid this coordination is bridging the specific departmental priorities with an overarching checks and balance system. Karan offered such a system in the form of a series of questions to be answered by all departments before development projects were passed.<sup>51</sup> In sync with the six development principles, these questions can help find the balance between urban development and preservation of agricultural land in Thimphu:

1. To what extent is the development plan consistent with environmental conditions and existing social-cultural institutions?
2. What will the social, economic and environmental consequences of the project be?
3. How can local people participate in the project?
4. What constraints exist on their participation?
5. How will the benefits of the projects from the project be distributed among the people of the area?
6. Will the project improve economic and social conditions for the poor people of the area?
7. Will there be a spread effect in the area?
8. Will there be any negative economic, social and cultural impact from the project?
9. How will the benefits of the project be sustained?<sup>52</sup>

Responding to these questions can ensure that the projects are in the best interest of locals. Once these goals are achieved, implementation does not present the same challenge as it did when the project was not supported by the population it affected. Bhutan can look to these examples for guidance in identifying the “essential elements of the framework needed to support [sustainable development] strategy.”<sup>53</sup>

## Summary

These six principles, along with the mechanisms and incentives needed to implement them, provide real solutions for Thimphu’s urban growth and development. To counteract the current development trends, the application of these principles can develop a self-sufficient, sustainable plan. Their implementation can be supported if the architecture, planning and development departments of Urban Development and Housing (DUDH) and Thimphu City Corporation (TCC) collaborate with the National Environment Commission (NEC), the Ministry of Agriculture, the National Commission for Cultural Affairs (NCCA), and other relevant departments. Together, they can foster the implementation of culturally, environmentally, and agriculturally sensitive development throughout Bhutan by identifying new

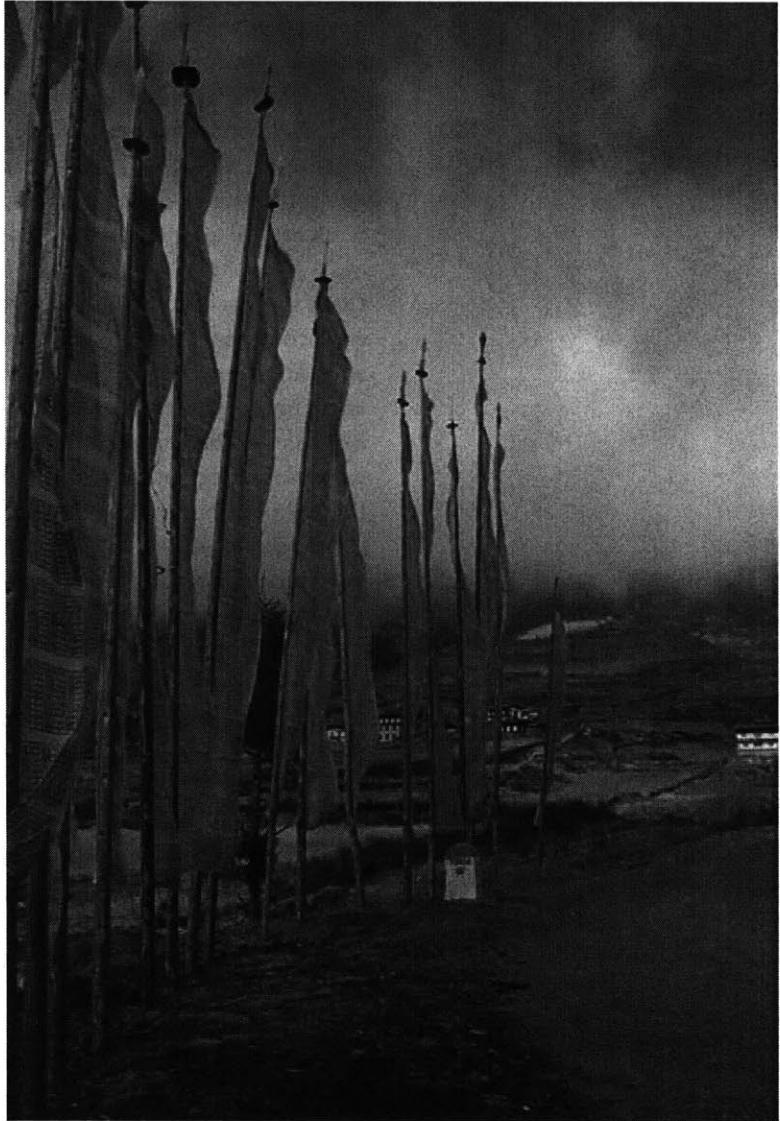
mechanisms to encourage development that improves the quality and longevity of life in the valley for generations to come. By providing incentives that support the implementation of the six principles and the lessons from the precedents, the Royal Government can come closer to realizing its goals.

## End Notes

- <sup>1</sup> Brewster, 34.
- <sup>2</sup> <http://www.asiarice.org/sections/whatsnew/what'snews.html#ecologybooklet>
- <sup>3</sup> <http://www.riceweb.org/aginfoasia.htm>; <http://www.countries.com/countries.com/countries/bhutan>; <http://www.worldrover.com/vital/bhutan.html>; [http://www.photius.com/wfb/wfb1999/bhutan/bhutan\\_economy.html](http://www.photius.com/wfb/wfb1999/bhutan/bhutan_economy.html)
- <sup>4</sup> World Bank, Jiangzi Integrated Agriculture Modernization Project, 3.
- <sup>5</sup> World Bank, Jiangzi Integrated Agriculture Modernization Project, 3.
- <sup>6</sup> *BBC*, Nov 14, 2001.
- <sup>7</sup> *BBC*, Nov 14, 2001.
- <sup>8</sup> Plengmaneeapun and Thapanachai, 2002.
- <sup>9</sup> Plengmaneeapun and Thapanachai, 2002.
- <sup>10</sup> Plengmaneeapun and Thapanachai, 2002.
- <sup>11</sup> East, 2001.
- <sup>12</sup> East, 2001.
- <sup>13</sup> <http://www.asiarice.org/sections/whatsnew/what'snews.html#ecologybooklet>
- <sup>14</sup> <http://www.asiarice.org>
- <sup>15</sup> <http://www.asiarice.org/sections/whatsnew/what'snews.html#ecologybooklet>
- <sup>16</sup> <http://www.asiarice.org/sections/whatsnew/what'snews.html#ecologybooklet>
- <sup>17</sup> <http://www.asiarice.org/sections/whatsnew/what'snews.html#ecologybooklet>
- <sup>18</sup> *Diadema: Consolidating Innovative Alternatives of Municipal Management, Brazil*, Best Practices Database, 4.
- <sup>19</sup> McHarg, 1992, 34.
- <sup>20</sup> McHarg, 1992, 34.
- <sup>21</sup> <http://web.mit.edu/urbanupgrading/upgrading/issues-tools/tools/reg-of-land.html>
- <sup>22</sup> Adhikari, World Bank Management Course Presentation, June 2001.
- <sup>23</sup> World Bank, Viet Nam: Northern Mountains Poverty Reduction Project, 5.
- <sup>24</sup> World Bank, Viet Nam: Northern Mountains Poverty Reduction Project, 5.
- <sup>25</sup> World Bank, Jiangzi Integrated Agriculture Modernization Project, 8.
- <sup>26</sup> World Bank, Jiangzi Integrated Agriculture Modernization Project, 8.
- <sup>27</sup> World Bank, Viet Nam: Northern Mountains Poverty Reduction Project, 5.
- <sup>28</sup> Brewster, 35.
- <sup>29</sup> Brewster, 33.
- <sup>30</sup> Planning Commission, Ninth Five Year Plan Background, 13.
- <sup>31</sup> Yezer, DUDH.
- <sup>32</sup> Untermann, 1977, 147.
- <sup>33</sup> Untermann, 1977, 119.
- <sup>34</sup> Brewster, 33
- <sup>35</sup> Brewster, 34.
- <sup>36</sup> Benninger, CCBA.
- <sup>37</sup> Karan, 1987, 145.
- <sup>38</sup> Planning Commission, Ninth Five Year Plan Background, 10.
- <sup>39</sup> Brewster, 34.
- <sup>40</sup> Karan, 1987, 145.
- <sup>41</sup> Brewster, 34.
- <sup>42</sup> Untermann, 1978, 176.
- <sup>43</sup> Untermann, 1978, 176.
- <sup>44</sup> Untermann, 1978, 85.
- <sup>45</sup> Engelhardt, 1.
- <sup>46</sup> Engelhardt, 2.
- <sup>47</sup> Karan, 1987, 144.
- <sup>48</sup> World Bank, Indonesia Country Study, Indonesia, Executive Summary, xxii.
- <sup>49</sup> *Diadema: Consolidating Innovative Alternatives of Municipal Management, Brazil*, Best Practices Database, 4.
- <sup>50</sup> Brewster, 34.
- <sup>51</sup> Karan, 1987, 146.
- <sup>52</sup> Karan, 1987, 146.
- <sup>53</sup> World Bank, Indonesia Country Study, Executive Summary, xxii.



# Conclusion



The intent of this thesis was to generate sustainable development strategies that allow Thimphu to balance its urban growth requirements with the kingdom's environmental and cultural preservation goals. To do this, it was necessary to articulate Bhutan's unique place in the urbanization process and compare its similarities to other countries. Therefore, the first chapter revealed Bhutan's sensitive cultural, spiritual and historic relationship with the environment, specifically the rice farms that are in greatest threat of disappearing today. The second chapter described the current challenges that the city and residents of Thimphu face as development challenges the region's cultural values and environmental resources. The third chapter highlighted and critiqued the Royal Government of Bhutan's great body of environmental and developmental legislation to show where legislation is successful and where it is ineffective.

Once this background information was established, the thesis focused on recommendations to sustain cultural and environmental resources and satisfy housing needs. Based off the analysis in Chapters Two and Three, six environmentally sensitive development principles were identified to be lacking in Thimphu. Chapter Four introduced global examples of regions and cities that have grappled with similar issues that Bhutan is facing. Dissimilar in character, each of the global precedents observed at least four of the six principles and served as examples of how to develop healthy, livable environments that respect traditional values, environmental resources, and economic conditions. Chapter Five further articulated these lessons and principles and applied them directly to Thimphu. This final chapter offered practical and specific mechanisms and incentives which the government can utilize to meet its development needs, while satisfying the nation's agenda.

The global relevance of Bhutan's situation has been established to show that while the country stands alone in its historical and cultural approach to development, this unparalleled position does not prevent the kingdom from facing the global challenges resulting from globalization and urbanization. Comparatively, in western countries, modernization and technology are just now being used to aid natural processes rather than as a means for replacing those processes. While we in the United States are just "learning to live lightly on the land by using our technology to enhance our relationship to the natural environment, rather than to isolate and alienate us from it," Bhutan has taken steps towards that goal since its emergence as a nation.<sup>1</sup> Unlike, the United States and other developed countries, Bhutan's environmental and cultural conservation efforts are deeply embedded in the country's history. The most recent iterations of these goals are expressed in the kingdom's *Vision 2020* and its evaluation of Gross National Happiness. Bhutan's unique framework to measure the country's status in reaching their goals is not a common indicator for

most of the world. The Gross National Happiness indicator represents the intent of the government to prevent material wealth becoming the riding factor in the development of the country.<sup>2</sup> Hearing the term for the first time brings smiles to most people's faces. This comes as a refreshing change for those of us living in globalized countries especially when our own countries' method of measurement has not resulted in a high quality of life for the majority of the population. "There is a widening certainty that the Gross National Product does not measure health or happiness, dignity, compassion, beauty or delight, and that these are, if not in alienable rights, at least most worthy aspirations."<sup>3</sup> Bhutan has long since recognized this and thus has an uncommon position in reaching its goals toward sustainability.

Yet, as unique as it is, Bhutan is facing similar challenges to issues that are familiar to countries everywhere. Despite Bhutan's progressive vision and legislation, during this time of rapid urbanization the country risks losing much of what it holds dear—its environmental resources and cultural identity. Considerable attention has been given to the conservation of Bhutan's forestland and biodiversity. In addition, the government has identified many ways to keep Bhutanese culture alive. But a crucial element has been left out of both of these efforts: rice paddies. The thesis has argued that the rice paddies, as well as the valley's natural landscape, must be viewed as both environmentally and culturally significant if the government is to satisfy its national agendas. The valley, which currently is viewed as devoid of value aside from the potential it holds for development, is rich in resources. The micro ecosystems that depend on the paddy wetlands cannot be left out of the preservation of biodiversity agenda. The quality of the Wang chu River and the multitude of tributaries and streams that run into it is at stake due to the current development techniques. What happens to these bodies of water will not merely affect Thimphu, but rather will affect the entire watershed, adjacent watersheds and the life that they support. Therefore, it is imperative that the government adjust its development practices to reflect sensitive approaches that help the resources continue to bring life to the valley for future generations.

The sustainability of Bhutan is on the line. Given that our national actions have global effects, it is important that Bhutan remember that depending on India for its rice and other food staples will affect the sustainability of both countries. The experts on rice, its availability, and the cultures that cultivate it warn that the loss of farmland and farmers will affect us all. Thus Bhutan cannot underestimate the importance of maintaining its own crop supply.

In addition, Bhutan's adaptation of the globalized approach to housing development that is considered progressively modern, is often in direct

conflict with the environment. This thesis has stressed the need for sensitive design and construction of housing settlements that celebrate tradition and culture, while minimizing development's effect on the environment.

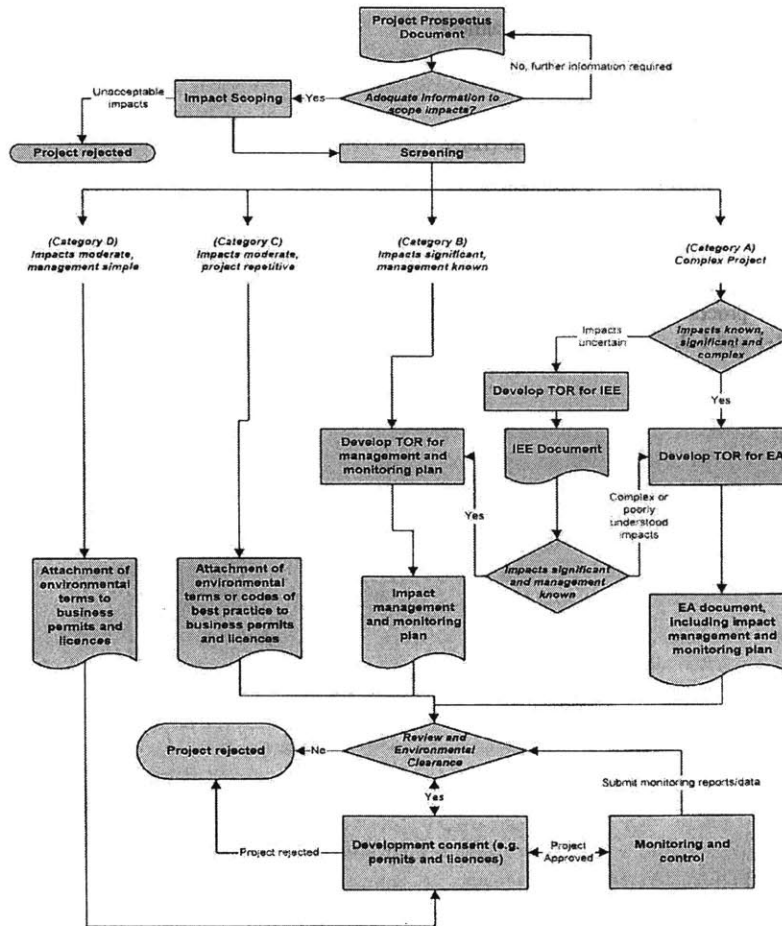
All of these recommendations can come together to form a framework with which Thimphu can develop into the dignified capital city of Bhutan. Thimphu has the ability to transition into a city rich in culture, natural resources, and modern amenities. Let us hope that in twenty years, urban village clusters of quality housing and commerce are surrounded by fertile terraces. Dense housing clusters perched among pine trees and natural vegetation can reinforce the hillsides, providing residents with ample natural light and views, and leaving the rich valley soil available for farming. And Bhutanese families can continue to indulge in the locally grown red rice that satisfied their ancestors. Setting a modern precedent for other emerging towns, the careful development of Thimphu can make a lasting impression on the country. With it, the integrity of Bhutan can live on.

## End Notes

- 1 Bensler, 35.
- 2 Acharya, 35.
- 3 McHarg, 23.

# Appendix A-1: NEC's Environmental Assessment Process

## Procedure for Project Assessment





## Appendix B: Vietnam's Land Acquisition Process

### STEPS IN LAND/PROPERTY ACQUISITION AND COMPENSATION

#### For Each Sub-Project Involving Land and Property Acquisition

	Activity	Responsible	When
	Orientation and training in the Compensation, Resettlement and Rehabilitation policy and procedures will be provided to districts and communes	CPMO, PPMO and assisted by World Bank staff	
1.	Commune works with villagers to select and prioritize development activities including infrastructure for construction and/or improvement	CDC	During planning period
2.	CDC consults and discuss potential land and structure acquisition impact with affected head of household	CDC	During planning period
3.	District engineer and CDC design infrastructure and finalizes exact amount of land and structure to be affected	District Engineer, CDC	During start of implementation
4.	Complete inventory and socio-economic survey of affected households	CDC and District Engineer	During start of implementation
5.	Hold another consultation with affected households and agrees on compensation and provide contact names and address for grievance/complaints	CDC	During start of implementation
6.	Complete entitlement form and set schedule and funding source for payment	CDC and DPMO.	During start of implementation
7.	DPMO submits all 4 completed forms to PPMO for review	DPMO	Four months before award of contract for construction
8.	PPMO submits them to CPMO and World Bank for review	PPMO/ CPMO	Three months before award of contract for construction
9.	Review and clearance	World Bank (Year 1 by HQ and Year 2 to 5 by Hanoi Office)	
10.	PPMO pays cash compensation to affected households from provincial budget for affected structures, trees, crops and rehabilitation assistance. Commune provides compensation for affected agricultural and productive land from commune land bank.	PPMO CDC	Before award of contract for construction
11.	World Bank provide "no objection letter" (NOL) for award of contract for construction work.	World Bank (Year 1 by HQ and Year 2 to 5 by Hanoi Office)	

CDC - Commune Development Committee  
 DPMO - District Project Management Office  
 PPMO - Provincial Project Management Office  
 CPMO - Central Project Management Office

#### Forms and Schedule:

1. Inventory form (see Attachment 2)
2. Entitlement form (see Attachment 3)
3. Socio-economic survey (see Attachment 4)
4. Schedule of Compensation and Payment Activities (to be prepared by each sub-project)

Source: World Bank Country Study. 2000. "Viet Nam: Northern Mountains Poverty Reduction Project," *Policy Framework for Compensation, Resettlement and Rehabilitation of Project Affected Persons*. Washington D.C.:

The World Bank.

## Appendix C: Additional Development Guidelines

### Building Green

"There are no sustainable materials, there is only the sustainable use of materials."

—Andrew St. John, *Environmental Building News*, November 1994

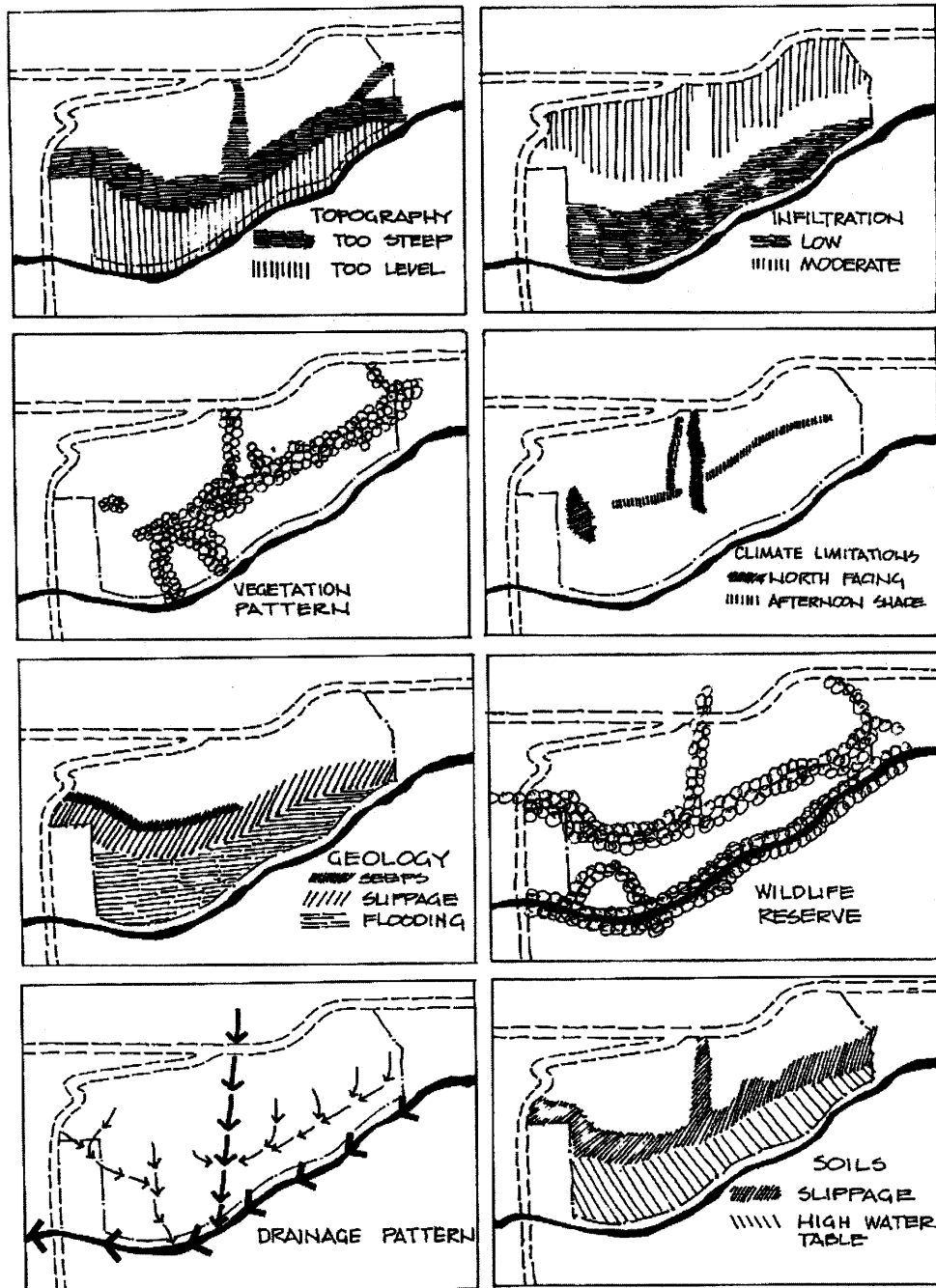
While building inevitably consumes materials and energy resources, the technology is available to use methods and materials that reduce a building's environmental impacts, increase operating efficiency, and increase durability. "Building green" means using such techniques.

For environmentally responsible development, development practitioners must think in an integrated way. The following is a list of things to consider when designing environmentally responsible buildings. It is not a list of extras to be tacked on to old-style buildings, but a summary of principles to be synthesized in the creation of the built environment.

- Optimize the use of natural resources found on site.
- Minimize the building's impact on the site.
- Integrate site resources, materials, and systems.
- Design for passive energy conservation.
- Study vernacular traditions and integrate them with new, energy- and resource-efficient technologies.
- Reduce building size; use space-efficient design to minimize the use of land and materials resources while providing more interesting and livable spaces.
- Factor in life cycle costs and select the most cost-effective and durable materials.
- Use superinsulated and thermal mass walls to optimize passive heating and to reduce the cooling load.
- Use special insulated windows to reduce heat loss and create passive heat gain in winter; use designed overhangs and shading to reduce cooling load in summer.
- Minimize the use of sawed lumber for structural purposes.
- Increase the use of engineered wood products and products made from recycled materials.
- Use nontoxic finishes and insulating materials.
- Do not use materials and components containing chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs).
- Use downsized, high-efficiency HVAC systems and solar water heaters.
- Maximize natural daylighting for interiors and minimize use of artificial lighting.
- Use high-efficiency lighting systems including color-balanced fluorescent bulbs, electronic ballasts, spectral imaging reflectors, occupancy sensors, task lighting.
- Use low-flow toilets, faucets, and showerheads.
- Use xeriscape landscaping with drip irrigation, graywater systems, and rain harvesting.
- Minimize and recycle construction waste.
- Reuse and recycle materials and buildings.
- Design in flexibility to accommodate changing future needs.

Source: Brewster, George Burton, "A Better Way to Build," *Urban Land*, Vol. 54, no. 6, June 1995.

## Appendix D: Untermann's Site Analysis Diagrams



Source: Untermann, Richard and Robert Small. 1977. *Site Planning for Cluster Housing*. New York: Van Nostrand Reinhold Company.

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