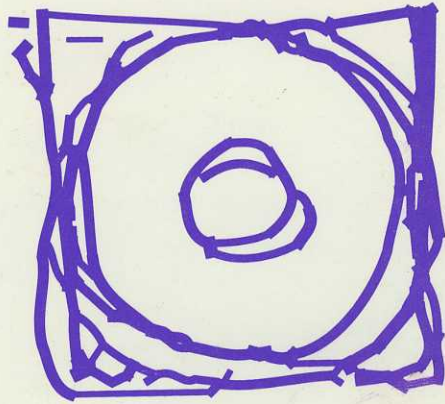


# The Indian Monsoon: Building Thermal Performance and Cultural Expectations

M. Susan Ubbelohde

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International  
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# ARCHITECTURE + CULTURE

## PROCEEDINGS

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# Table of Contents

Director's Preface	9	Theory IV: Conceptual Models	
Editor's Introduction	10	On The Historical and A-Historical Discourse of Spatiality	
<i>Design and Cultural Theory</i>	13	ARTHUR HUI-MIN CHEN	81
<u>Theory I: The Cultural Formation of Architecture</u>		A Steel Cloud on the Pacific Rim: Los Angeles	
The Ethical Structure of Architectural Form:		as the West Coast Gateway	
Preliminary Notes Describing an Adequate		MICHELE A. RYAN	86
Ethics of Architectural Work		Deeper Than Decon: Culture and	
CLIVE DILNOT	15	Conflict in Architecture	
"We are...not in the agora of the philosophers:"		GEORGE L. CLAFLEN, JR.	87
A Critique of Poststructuralist Readings of		The Micromegas and Quantum Cosmology	
Le Corbusier's L' Art décoratif d'aujourd'hui		JOHN HIENZT	95
HELENE LIPSTADT	26	<i>Architecture Between Cultures</i>	103
The Poietic in Contemporary Architectural Culture:		<u>Architecture Between Cultures: Asia</u>	
Le Corbusier, Heidegger, and Manfredo Tafuri		The Indian Monsoon: Building Thermal Performance and	
HELENE LIPSTADT		Cultural Expectations	
HARVEY MENDELSON	34	M. SUSAN UBBELOHDE	105
<u>Theory II: Representation and Culture</u>		Places For Gods And Humans:	
Tatlin's Tower Model		The Architecture Of Traditional Settlements	
ALBERT C. SMITH	41	In Bali And Nepal	
On The Place Of Culture In The Theoretical		JOSEPH L. ARANHA	114
Edifice Of Architecture		The Traditional Architecture of Sumba	
AMIR H. AMERI	44	Barat as an Expression of	
Models: Instrumental and Iconic		Sumbanese Spiritual Beliefs,	
ALVARO MALO	52	Culture and Social Structure	
Two Textual Levels of Architecture		JOANNA MROSS	120
GEVORK HARTOONIAN	56	Architectural Space: The Cultural Image	
<u>Theory III: Contemporary Critical Theory</u>		XIAO-TU XU	128
The Chicago Tribune Competition as Caricature		National Architecture, Fiction or Reality:	
KENDRA SCHANK SMITH	61	The Sri Lankan Experience	
Life Before Death:		NIHAL PERERA	135
Four Possible Architectures		<u>Archeologies of Place</u>	
JOHN ARCHEA	67	Living with Climate:	
Intersectionality - Architecture/ The Body Politic		Science, Intuition, Architectural Creativity	
MILTON S. F. CURRY	73	CHARLES MIDDLETON	141

The Pompeian House : Participation in a Story Already Begun CLIVE KNIGHTS	145	Architecture and the Cultural Landscape	
Pre-Incaic Architectural Form and Constructional Technique at Marcahuamachuco, Peru STAN LOTEN	153	Spectacular Capital, Civic Identity, and the Architecture of Mississauga City Hall L. JILL DELANEY	233
Built Forms of the Plains HARRIS STONE	157	The Suburban Visual Environment: A Report on Six European and American Suburbs WALTER B. JONES	239
<hr/> Architecture Between Cultures: Europe <hr/>		Postcards From the Edge: California and Quebec in North America ANNMARIE ADAMS	247
Traditions of Wooden Architecture in the Lands of the South Slavs JUDITH BING J. BROOKE HARRINGTON	165	"Two Rodeo Drive: The Work of Architecture in an Age of Commodity Consumption" TERRANCE GOODE	250
Abstract Geometric Order and Continuity of Tradition Case Study - Ukrainian Architecture RADOSLAV ZUK	172	<hr/> Teaching Cultures: The Training of Architects <hr/>	
"Das Neue Bauen" And The Notion Of A-Perspectival Space: A re-investigation of early modernism in Germany UWE DROST	177	Reconceptualizing Architectural Education: The Necessity for a Culturalist Paradigm LINDA N. GROAT	259
Private Spaces and Social Spaces of Rome in The Settecento: The Nolli Maps as a Cultural Icon ALLISON HOADLEY ANDERSON	180	Cultural Studies and Critical Pedagogy: Towards A Critical Architecture via Cultural Pedagogy THOMAS A. DUTTON	265
The Space of Commemoration as a Window of Political Imagination: The French Bi-Centennial in Paris SARAH BONNEMAISON	185	Expert Knowledge, Design and Cultural Reproduction CHARLES C. GORDON	274
<hr/> Architecture and the Islamic World <hr/>		The Power of the Everyday DAVID G. SAILE	278
Dimensioning Democracy: The American Embassy in Baghdad SAMUEL ISENSTADT	191	<hr/> Cultural Considerations of Architecture in Detail <hr/>	
Diurnal Rotation: The Living Tradition of Afghan Court and Aiwan BASHIR A. KAZIMEE JAMES McQUILLAN	198	Structural Morphology From A Cultural Perspective MICHELE MELARAGNO	279
Paradise and Artifact: An Urban Design Proposal for the Revitalization of Samarkand DEAN J. ALMY III	207	Reconciling Culture and Technology: Possibilities and Im-Possibilities NADIA ALHASANI	282
Isfahan: Drawing an Understanding CHARLES MASTERSON	214	Imitation, Innovation, Inhibition: Paradoxes in Concrete, Moscow, 1880-1940 ELIZABETH ENGLISH	283
Culture And Cross-Culture: observations on design education MASOOD A. KHAN	223	Architecture and Utopia in the Electronic Age CONSTANTIN TERZIDES AND LINDA GROAT	285
<i>The Culture of Architecture</i>	231	Concepts for Lunar and Martian Architecture GARY T. MOORE	290
		<hr/> The Culture of Professionalism <hr/>	
		A Story of an Architect and a Culture SANJOY MAZUMDAR	297
		Cultural Structures/Architectural Structures MADLEN SIMON	302
		Building Maintenance DAVID STRAUSS	

KEVIN KANE	308	Race, Space, and a Pedagogy of Place for Black Urban Resistance	383
<i>'Other' Architectures</i>	313	STEPHEN N. HAYMES	
<hr/> Design With and For Aboriginal Peoples <hr/>		<i>Research Praxis</i>	389
Pangnirtung Arts and Crafts Studio Schematic Design		<hr/> Workshop I: The Practising Researcher <hr/>	
KEITH IRVING	315	Le financement de la recherche en architecture : la nature des obstacles	
Housing for Aboriginal Seniors		The funding of research in architecture : the nature of obstacles	
NANCY GNAEDINGER	317	PIERRE A. LETARTRE	391
<hr/> Building Communities: Cultural Continuity and Renewal <hr/>		<i>Appendices</i>	399
Evaluation of Narrow-Front Rowhousing Based on the Grow Home		Appendix One: List of Presenters	401
AVI FRIEDMAN		Preliminary Symposium Programme	407
VINCE CAMMALLERI	321		
Creating and Maintaining Culturally Identifiable Neighborhoods: The Cultural Intervention Model			
MICHAEL S. OWEN	329		
Projects in the Peak District National Park, England			
RUSSELL LIGHT	335		
Cultural Traditions and Domestic Space: An Example from India			
SHAMPA MAZUMDAR			
SANJOY MAZUMDAR	340		
<hr/> Architecture and Canadian Culture <hr/>			
A Critical Anatomy of Canadian Architecture			
MICHAEL McMORDIE	345		
Interpreting Architecture in the Folk Context			
ROBERT MELLIN	350		
Reaction or Regionalism: Architecture after 1918			
KELLY CROSSMAN	357		
The Culture of Modernism: Vancouver's Public Libraries 1947-1957.			
RHODRI WINDSOR LISCOMBE	358		
Gender, Race, and the Culture of Architecture			
Coltrane and Musica Practica: An Interrogation through Design			
DAVID P. BROWN	363		
Grete Lihotzky and the Frankfurt Kitchen			
S. R. HENDERSON	370		
Hysterical Sites/Pantomimic Bodies: A Feminist(s) Reading of the Canadian Museum of Civilization.			
SUSAN DOUGLAS	378		

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*"European methods of historical inquiry, arising out of one kind of civilization, with its own developing ideas of the human condition, cannot be applied to Indian civilization; they miss too much."*<sup>1</sup>

V.S. Naipaul, *India, A Wounded Civilization*

*"Whatever Man sees, has seen or will see, is just one facet of a crystal. Each of these facets from its due angle provides a correct viewpoint, but none of them alone gives a true all-comprehensive picture. Each serves in its proper place to grasp the Whole, and all of them combined come nearer to its full grasp. However, even the sum of them all does not exhaust all hidden possibilities of approach."*<sup>2</sup>

Betty Heimann, *Facets of Indian Thought*

## ABSTRACT

Current research in building thermal performance is methodologically based in the building sciences and rarely expands beyond issues of heat transfer and building operation. The results draw a picture of the way a building creates an interior thermal environment separate from outside conditions. Ground-breaking studies are those which address issues of occupant comfort, expanding the thermal behavior to its impact on building occupants. Field work by the author and collaborator G.A. Loisos on thermal performance of buildings in Ahmedabad, India revealed that the scientific description of climate was one-dimensional. As such, climate data are incapable of generating designs truly responsive to climate as understood in Indian culture. This paper reviews the standard process of "climate responsive design" for monsoon conditions and proposes that an understanding of the cultural role of the monsoon season is also necessary to create an architecture of meaning.

## DESIGN FOR CLIMATE

The outdoor climate has traditionally been measured and recorded for agricultural practice, not for architecture. Such data, however, offer the possibility of an

architectural climate analysis, developed most coherently by Victor Olgyay. In his seminal work, *Design with Climate*, Olgyay proposes a design method:

"Architectural expression must be preceded by study of the variables in climate, biology and technology. The first step toward environmental adjustment is a survey of climatic elements at a given location... Since man is the fundamental measure in architecture and the shelter is designed to fulfill his biological needs, the second step is to evaluate each climatic impact in physiological terms. As a third step the technological solutions must be applied to each climate-comfort problem. At the final stage these solutions should be combined, according to their importance, in architectural unity."<sup>3</sup>

These steps (analysis of climatic data, evaluation of human comfort, evaluation of technological solutions and architectural application) have become the backbone of subsequent texts.<sup>4</sup> Design guidelines developed from quantitative studies are often substituted for Olgyay's third step, but this does not change the basic methodology for climatic design. The staying-power of this model, now nearly three decades, is a testament to the ease with which it supports the "analysis-synthesis" design process so widely taught and practiced in the United States during the same decades. Climatological data (temperature, relative humidity, air movement, solar radiation, etc.) operate as scientific inputs for the design process which guarantee a better performing building. The most useful conception of the building in this context is the building a mediator between the occupants inside and the climate outside. The envelope, as John Reynolds writes, becomes "a theater where the interaction between outdoor forces and indoor conditions can be watched."<sup>5</sup>

## AHMEDABAD AND THE MONSOON SEASON

Field studies in the Indian city of Ahmedabad provided an opportunity to examine Olgyay's proposition



**Bicyclist on Monsoon Rains, Ahmedabad.**  
(photo: G.A. Loisos)

that climatological design method can assist in generating an architecture which provides human thermal comfort in a severe climate. Western India is dominated by an annual cycle of a very hot dry summer (generally late March to mid-June) followed by a three month rainy season caused by the southwest monsoon off the Arabian Sea. Monsoon comes from the Arabic *mausim*, meaning *season*, and these rains constitute a definitive season for the region. Climatologically, the monsoon season is described in terms of the arrival date, the amount and intensity of the rain during the season and the departure date.

The arrival of the monsoon in Ahmedabad is typically between June 15 and June 21. Throughout the final weeks of May, clouds appear and the relative humidity increases. Although the arrival date is almost predictable once the rains have reached the southwest coast of Kerala, the style of arrival varies. In 1989, after some years of drought, the rains arrived suddenly with the drama of a huge dust storm. Late one afternoon, the sky became dark and a brown cloud moved toward the city with winds averaging nearly 50 mph. A fierce dust storm hit first, followed by a heavy rain..

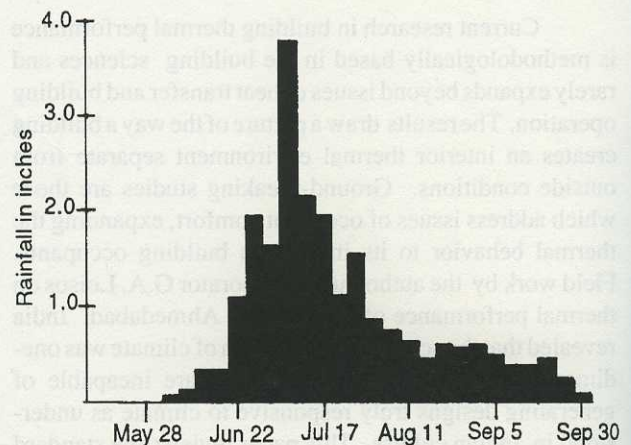
With the first rains, the temperature dropped from 107° F to 78° F in less than twenty minutes. Relative humidity jumped during the same period from 34% to 90%.<sup>6</sup> The season had changed dramatically in one afternoon. Jawaharlal Nehru, first Prime Minister of

India, however, recorded a very different onset years earlier in Bombay:

“I became a watcher of the skies, waiting to spot the heralds that preceded the attack. A few showers came. Oh, that was nothing, I was told; the monsoon has yet to come. Heavier rains followed, but I ignored them and waited for some extraordinary happening. While I waited, I learnt from various people that the monsoon had definitely come and established itself. Where was the pomp and circumstance and the glory of the attack and the combat between the cloud and the land and the surging and dashing sea? Like a thief in the night the monsoon had come to Bombay ...”<sup>7</sup>

The rainy season in Ahmedabad lasts approximately three months. During some weeks there is just a bit of rain every day, other weeks bring days of torrential rains and floods. One such day, August 21, 1989, nearly four and one-half inches fell during rush hour, producing, as the headlines described it, “Utter chaos as rains flood city”.<sup>8</sup> Throughout the monsoon, the daily weather prediction in the *Times of India* is unchanging: “One or two showers; rain or thundershowers likely at many places in the Gujarat region.”

Average rainfall data were used to develop a profile of rainfall (Figure 4) which portrays the variations in the monsoon in Ahmedabad. During the season, Ahmedabad receives a total of 32” of rain on average,



**Annual Rainfall Profile for Ahmedabad (Adapted from K. Ramamurthy, *A Study of Rainfall Regimes in India*. Madras: University of Madras, 1972)**

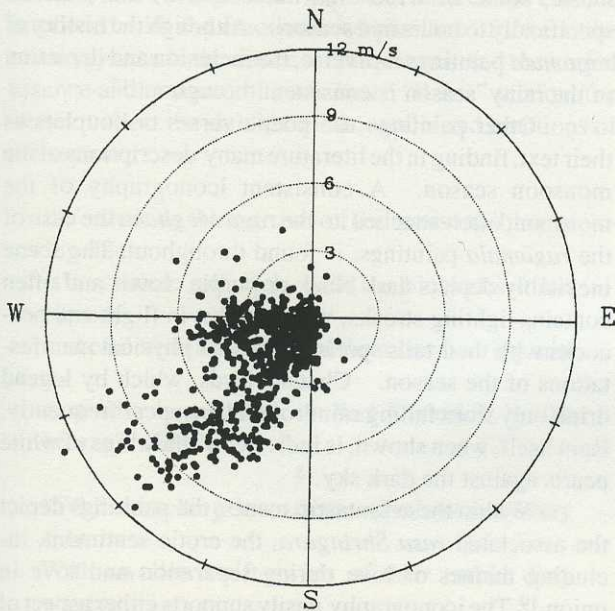
relative humidity stays very high (70-85%) and the skies are predominantly grey and overcast. Temperatures range from the mid-70's Fahrenheit during rainstorms and nights to the high 90's Fahrenheit at mid-day. The winds are steadily from the southwest.<sup>9</sup>

The withdrawal of the summer monsoon is gradual. Rainfall slowly tapers to nothing as the monsoon steadily

moves off from the sub-continent. The last rains in Ahmedabad are usually recorded by mid-September, leaving the city nine months of dry weather to follow.

#### DESIGN STRATEGIES FOR THE MONSOON

The role of the building as climatic mediator can best be understood with Olgay's bioclimatic chart. Plotting monitored temperatures and relative humidities from the monsoon season in Ahmedabad on the bioclimatic



Ahmedabad Monitored Wind Data, Aug. 3 -  
Sept. 3, 1989

chart indicates that conditions are "hot-humid". Thermal comfort in such conditions requires a building to provide shade, air movement and protection from the rain for its occupants.

Olgay's analysis of these climatic conditions advises that buildings should be long and thin in plan and section, sited for good air movement and built of low-mass materials. Glazed areas and walls should be shaded as much as possible while openings should be designed to admit and exhaust the cross winds.<sup>10</sup> These guidelines are echoed by Amos Rapoport's research on vernacular houses. He also found that "Humid heat areas ... call for open, low heat capacity buildings with maximum cross ventilation, and hence long narrow geometry and widely separated forms. The roof becomes the dominant element ...in effect, a huge waterproof parasol."<sup>11</sup> For the monsoon season in Ahmedabad, air movement and protection from rain take precedence in the role of the building design. Air movement can be provided by cross ventilation if the building design recognizes that the winds are out of the southwest, although many buildings also supply ceiling fans for dependable air circulation. Shade, while necessary when the sun breaks through the clouds, is a second-

ary consideration due to the continued overcast skies which characterize the monsoon months.

Le Corbusier, who ironically never visited Ahmedabad during the monsoon season, described the thermal role of buildings most eloquently:

"The country is tropical. The monsoon rages for two [sic] months of the year and is an alternating combination of downpours and sunshine. A western architect has spent his life learning his profession; to be sure he must apply his profession in India, but he must adapt it to antagonistic requirements: comfort is coolness, it is the current of air, it is the shade... Mosquitoes are everywhere and windows cannot be left open without special provisions being made. ...To play the role of a modern architect under these conditions is not easy."<sup>12</sup>

#### "NEED IS SO MANY BANANAS"

Following the data-based design process, the above summarizes what the architect must know to design a climatically responsive building for the monsoon season in Ahmedabad. A building designed following these suggestions will provide a cool breeze, keep the rain and sun out and not create too much mildew for the occupants. There is, however, that part of understanding which passes beyond measurable thermal comfort to those qualities which make architecture both profound and appropriate. As Louis Kahn describes, "Need is so many bananas. Need is a ham sandwich. But desire is insatiable and you cannot ever know what it is. It is renewed all the time."<sup>13</sup>

For a building to respond to climate other than technologically it must embody, make manifest or celebrate in some way the meanings of the climate for those who inhabit it. Climate, especially in India, is a profound context for a building, not only extreme in its severity, but potent in its cultural resonances and symbols. The challenge, then, is to explore the cultural meanings of climate, or in this case the monsoon, as an added lens through which architectural design can be understood and created. In India, the arts can act as a window on such cultural meanings.

#### THE MONSOON CELEBRATED.

Throughout the arts of India, the monsoon is represented and referenced time and again. One of the six seasons in the Hindu year, the monsoon occupies a special place culturally, as an object of affection and the embodiment of longing and eroticism. As such, the monsoon is tied directly to the central force in the arts of India, the *rasa*, which is translated variously as "flavor" or "essence" — the sentiment represented by the art through which an aesthetic experience takes place in the viewer or listener. "...the essential thing in poetry or drama [or



music or painting] is not story and character as such, but the emotion they embody. [The viewer] identifies himself with the representation and rapport is achieved through an emotional response and appreciation."<sup>14</sup>

### MUSICAL RAGAS AND THE MONSOON

Indian classical music is structured with the *raga*, which creates a pattern of melody with a well-defined mood and a particular scale. The *ragas*, or musical modes, are each associated with a particular *rasa* experience or sentiment. *Ragas* represent or belong to certain hours of the day and seasons of the year, and it is still considered by some a sign of ignorance to play or listen to a *raga* at the wrong time or season. "To enforce discipline among the musicians and their audience, the musicologists spread the superstition that by singing *ragas* at the wrong time one ill-treats them, and those who listen to them become impoverished, and their span of life is reduced."<sup>15</sup>

The connection between season and music is simultaneously an aesthetic experience of the *raga* and the literal belief in the power of the song. A traditional story describes a girl who sang a *raga* of the monsoon, causing clouds to form and rain on drought-stricken crops. Famine for the community was averted with the power of the voice and the appropriate *raga*. In a contemporary version of this story, photographer Steve McCurry reports from Madras the hiring of "a violinist, Kunnakkdui Vaiyanathan, [who] played *ragas* while simultaneously waist deep in

the Red Hills reservoir to seduce the rains. To cover their bets, the government hired cloud seeders from California."<sup>16</sup>

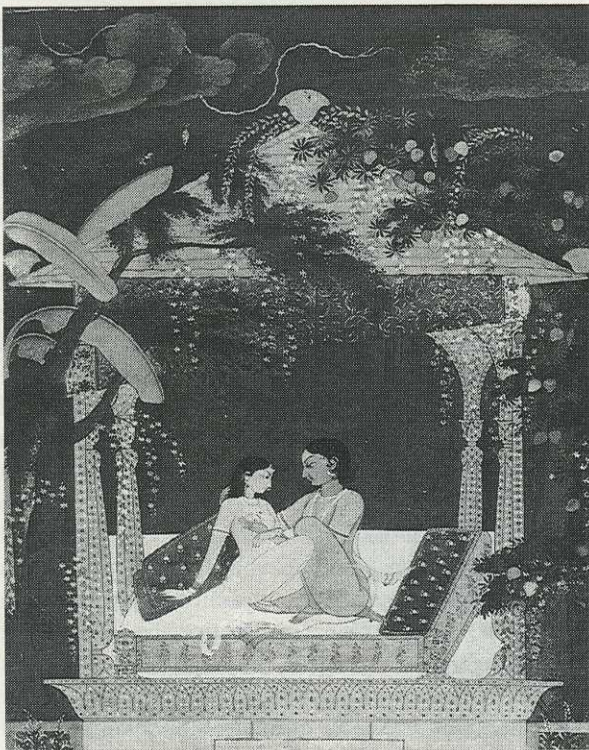
### PAINTING THE RAINS

The diverse traditions of painting in India include many depictions of seasons, especially the monsoon. *Ragamala* series, dating from the sixteenth century and later, portray anthropomorphically the melodies and musical structures defined as *ragas* in classical Indian music, some of which (as noted above) are attached specifically to hours and seasons. Although the history of *ragamala* paintings is diverse, the inclusion and depiction of the rainy season is consistent throughout.<sup>17</sup>

Other paintings use poetic verses or couplets as their text, finding in the literature many descriptions of the monsoon season. A consistent iconography of the monsoon, often attached to the *raga Megha* in the case of the *ragamala* paintings, is found throughout. The scene inevitably depicts dark black or purple clouds and often contains lighting streaks, white storks in flight and peacocks with their tails spread, all actual physical manifestations of the season. Chataka birds, which by legend drink only from falling raindrops, also appear frequently. Rain itself, when shown, is indicated with strings of white pearls against the dark sky.<sup>18</sup>

Within these fantastic scenes, the paintings depict the associated *rasa Shringara*, the erotic sentiment, including themes of love during separation and love in union.<sup>19</sup> The iconography easily supports either aspect of the erotic; the darkened skies can act as either as a threat for the lonely or as a friendly veil to hide passionate embraces. The meaning of such paintings is not lost in contemporary India. In *Chasing the Monsoon*, Alexander Frater reports a conversation with a man who paints for tourists on Chowpatty Beach in Bombay. His best selling painting is of the monsoon season and he describes it for Frater:

"The man is a prince. As the dark monsoon clouds gather over distant hills, he stands on terrace of palace, embracing his lover. Lightning has startled the white cranes and they are flying wildly up into black sky. That peacock roosting beneath the terrace will soon go off and dance joyously in the forest; peacocks always dance at start of the monsoon... The female musicians downstairs are serenading the rains and also our amorous couple. When the rain begins the couple will retire to the small pavilion and make love; as you see, a bed awaits them, the red counterpane signifying bliss...' 'But there's no rain.' 'Every single element in the picture is speaking of rain. The rain itself would be superfluous.'"<sup>20</sup>



"The Pavilion of Love: Radha and Krishna,"  
Pahari Painting, 18th Century. National Museum,  
New Delhi (from Goswamy, *Essence of Indian Art*)

## THE MONSOON IN POETRY

Lyrical poetry in India must be viewed in the context of the Sanskrit poet Kalidasa, who lived at an undetermined time (perhaps first century BC, perhaps circa 400 AD) in an undetermined part of the sub-continent (maybe central India, maybe Kashmir). Kalidasa's two major lyric poems, *Ritusamhara* (The Cycle of the Seasons) and *Meghadutam* (The Cloud Messenger), celebrate the power of the seasons, especially the monsoon.

The *Ritusamhara*<sup>21</sup> follows the six seasons of the Indian year. Through descriptions of nature and climate interlaced with the emotions and passions of lovers, the poem rejoices in the dance of the seasons and the varied essence and meaning of each. In the "Rains" section, the verses collect the sights, sounds, smells and emotions of the season:

"It's shaking thick groves of the monsoon-blooming trees;  
It's scented, full, rich, with the blossoms it has kissed,  
and cool from light touch of the water-bearing mist —

Just who is not made to feel homesick by the breeze?" (II/17)

"While knocking down trees on the banks on every side,  
With swollen swift swirls of their turbid dirty waves,  
Like lusty, bad girls as they flurry on their way —  
The rivers surge forth in a hurry towards the sea." (II/7)

"In spite of nights dark turned to darkness thicker still  
By clouds with loud roars and repeated thunder call,  
Their secret paths shown by the brilliant lightning bolts —  
From love they start forth: it's the trysting womenfolk." (II/10)

"With locks of hair dangling to lovely sloping hips,  
And drooping ear-loops made of blossoms scented sweet,  
Their breasts with pearl strand and their mouths with winy lips —  
The women bring forth their beloved's passion heat." (II/18)

In contrast to the joy of the *Ritusamhara*, the *Meghadutam*<sup>22</sup> explores an existential darkness and bittersweet longing coupled with a more profound eroticism that also characterizes the monsoon season. This

poem tells of a lover banished from his home and wife for a year to repay negligence in his duties. Eight months into his exile, the first monsoon clouds arrive and their presence increases the emotional pain of separation. Telling of the exile's requests to a passing cloud to carry a message to his wife, the poem contains two parts. The first, the "prologue to desire", details the route to the exile's house for the cloud's journey. Filled with verses both sensuous and suggestive, the poem follows the cloud as it brings coolness and rain along the path:

"There, on behalf of women who go to their lovers' dwellings by night  
One the king's highway where sight is sealed by darkness a needle might pierce,  
Brighten the ground with lightning smooth as the gold-proving touchstone,  
And, since they are timid, let no thunder roar as thy rain pelts down."  
(verse 37)

Along the way, the cloud itself is given leave to engage in dalliances with its lovers, the rivers:

"Suffused with the moisture of love, attain Nirvindhaya's course and unite with her,  
Whose girdle-string, a row of birds, resounds with the tremor of her waves;  
She stumbles bewitchingly as she moves, revealing her whirlpool-navel;  
For women's first avowal of fondness is confusion before their lovers."  
(verse 28)

The second and final part of the poem, the "epilogue of fulfillment", begins with a description of the exile's town Alaka, his house and his wife, whom he describes as wasting away with loneliness. The cloud is to deliver a passionate message of love from the exile and, in return, never be parted from its own love, the flash of lightning:

"With his body thy body he enters; all-haggard body with haggard;  
Fevered with intensely fevered; tear-flowing with tearful;  
incessantly eager  
With eager; hotly sighing with yet more abundantly sighing;  
In his thought, far distant as he is, and the way barred by adverse fate."  
(verse 98)

## DUALITY OF THE MONSOON IN INDIA

The celebration and evocation of the monsoon in the arts closely matches the joy experienced with the

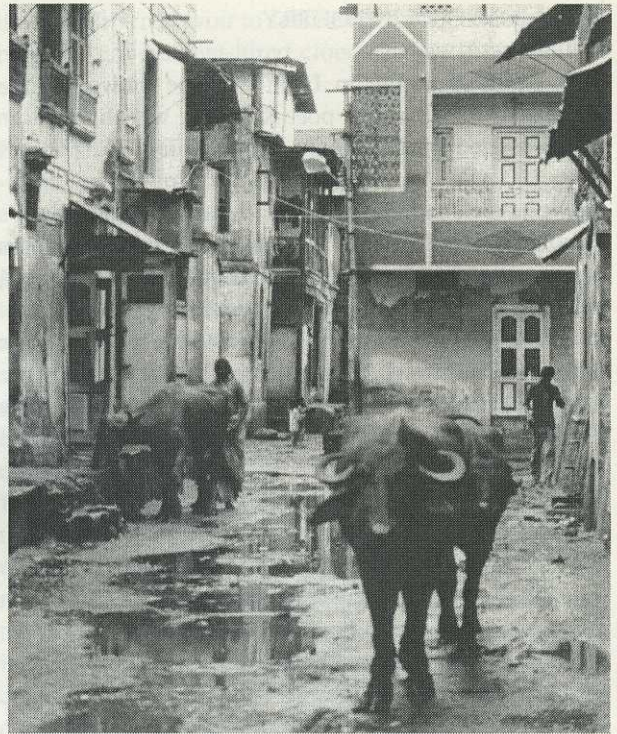
actual arrival of the monsoon. As McCurry writes, “The coming of the rains brings a complete transformation of the spirit, a sensation of being born again.”<sup>23</sup> In large part, this can be understood only in relation to the season which the monsoon dismisses, the Indian summer. From March until the first rains, life is controlled by the cycle of day and night — intense sun followed by partial relief provided by the clear night sky. The arrival of the rains releases everyone from the bounds of this rhythm while it cools and refreshes the earth. Inside and outside become reconnected, no longer separated by the deep shadows and closed windows of summer. The earth turns green after nine months of dusty brown. Peacocks are noisy and visible in their courtship display. Cows become heavily pregnant and exotic flowers bloom from plants which before looked like dry sticks. The first rains bring a time of fertility, fecundity and considerable beauty.

### COMPELLING THE RAINS

Without the rains, an agriculturally-based country such as India starves; the possibility of famine has historically been a reality in people’s lives. Throughout the regions and cultures of India, there is a strong tradition of “rain compelling” folklore. Rain, its wetness, its accompanying thunder, lightning and even frogs which appear during the monsoon are all imitated, as a form of “productive magic”. In songs from all over India, not only the sounds of rain, but symbols of rain such as strings of pearls, are called on to compel the arrival of the monsoon. Scarce water is poured and scattered over special places such as the threshold, over nude virgins dancing at night, over shrines such as the *siva-linga*. The gods are propitiated with offerings, songs, and symbolic ceremonies such as the wedding of lightning to the clouds and the ritual wedding of frogs. “...it is clear that Lord Indra [God of rain and thunder] is worshipped, prayed, moved, cajoled, threatened, abused and lastly allured and every possible steps are taken [sic] to extract water from him.”<sup>24</sup>

### STOPPING THE RAINS

After the first flush of pleasure, however, the reality of the season begins to sink in. Monsoon rains can bring severe floods and loss of human life. Newspaper accounts grow more and more tragic as the monsoon continues, detailing epidemics of water-borne diseases such as cholera, dysentery, and gastroenteritis. Rains bring malaria-carrying mosquitoes. Buildings and walls collapse, electrical and telephone lines fail, streets are flooded, and eventually even those untouched by tragedy become continuously irritable. “The problems of keeping clothes and shoes dry are formidable ... it’s the time mildew grows on books; when your *Complete Works of Shakespeare* starts turning pea green a certain melancholy, inevitably, sets in.”<sup>25</sup> This melancholy and the



City Street during August Rains.  
(photo: G.A. Loisos)

associated attitude of trying to ignore the rest of the season explains, in part, the design of the traditional urban house in Ahmedabad, the *pol* house. A courtyard house that delivers exceptional comfort during the hot dry summer season, the *pol* house becomes a damp, moldy cave during the monsoon, keeping rains at bay with sheets of plastic and other temporary measures. The house occupants simply wait out the discomfort of their houses, hoping for the season to end quickly once the pleasure has worn off.<sup>26</sup>

This aspect to the season is rarely written of except in news accounts. The somber side of the rains comes every year, but is hard to remember during the excruciating months of summer heat. The folklore, however, contains nearly as many “rain stopping” rituals and songs as there are “rain compelling” rituals. The rituals first try pleasing the gods and then become angry and threatening. A Punjabi agricultural proverb puts it all into perspective: “All these four things are bad: Excessive rains, excessive sunshine, excessive laughter and excessive silence.”<sup>27</sup>

In western India, and particularly in Bombay, the end of the monsoon is both prayed for and celebrated with the ten day Ganpati Chaturthi festival which culminates on the night of the full moon in mid-September. Neighborhood groups purchase a clay or plaster statue of the elephant god *Ganesh*, the remover of obstacles. The decorated and painted statues become objects of *puja*, or worship, with offerings of sweets, powders, incense and the like. On the final day, the statues are carried with great fanfare to the sea and immersed. Over a million people on Chowpatty Beach alone watch as the statues are broken by

the waves and dissolve in the water, thus calming the seas and signaling the end of the rainy season.

### THE RAINS AND THE COSMIC ORDER

Over and above the initial pleasure and subsequent aggravation of the rainy season each year, the monsoon holds a place within the cosmology of the Hindu world, conceptually anchoring people to their physical world in a way which is quite different from that of Judeo-Christian tradition in the West. "The landscape where he [sic] lives is not a mere flux of phenomena, it has structure and embodies meaning. These structures and meanings have given rise to mythologies (cosmogonies and cosmologies) which have formed the basis of dwelling."<sup>28</sup>

Basic to the Hindu notion of the world is the infinite and cyclical nature of time. As the world is created, destroyed and recreated through nested cosmic cycles, individuals similarly face the prospect of an infinite cycle of birth, death and rebirth. There is a clear relationship between the annual cycle of the seasons and the more abstract notions of time as cyclical; the cycle of the seasons in India is an extraordinarily powerful experience. McCurry writes, "... in the heart of the monsoons, I was forced to immerse myself in weather so profound that nothing else mattered — not art, not culture, not intellect. It was a lesson in humility."<sup>29</sup> The conception of the universe, creation and a person's position within all of it is directly reflected in the myths and symbols of the culture.

The Hindu myths of creation and dissolution, in particular, bear striking resemblance to the reality of the seasons in India. When one day of *Brahma* (a *kalpa*, 4,320,000,000 days or somewhat over 11 million years) has elapsed, *Vishnu*, the Supreme Being, destroys the universe:

"In this Indian conception of the process of destruction, the regular course of the Indian year - fierce heat and drought alternating with torrential rains - is magnified to such a degree that instead of sustaining, it demolishes existence. ...The whole world dries up and withers, the earth splits, and through deep fissures a deadly blaze of heat licks at the divine waters of the subterranean abyss... All goes up in a gigantic conflagration, then sinks into smoldering ash. Finally, in the form a great cloud, *Vishnu* sheds a torrential rain, sweet and pure as milk, to quench the conflagration of the world. The scorched and suffering body of the earth knows at last its ultimate relief, final extinction, *Nirvana*...The fecund water-womb receives again into itself the ashes of all creation ... The moon, the stars dissolve. The mounting tide becomes a limitless sheet of water. This is the interval of a night of *Brahma*."<sup>30</sup>

At the end of the night, *Vishnu* stirs the waters, a wind arises, fire is created and the universe is reborn to exist during another day of *Brahma*.

### MAKING PLACE

Surely it is not enough, in the richly laden cultural context of monsoon, to design a building which simply provides shade and cross ventilation and call it "climate responsive". It is not that thermal comfort is not important within Indian culture. Thermal comfort is as essential to well-being in India as in the United States and Indians often seem to be far more sensitized to the issue since the climate is such an unavoidable part of their lives. Rather, climate offers a rich source of architectural meaning beyond the technological or physiological. Norberg Schultz has described this act of design as finding and defining the "Spirit of Place".<sup>31</sup> Climate is a phenomenon through which a place is defined with temporal rhythms. The place cannot be separated from the experience. An architecture which recognizes this provides what Norberg Schultz calls "an existential foothold" in the natural world.

The Hindu notions of time and the cultural meanings attached to it are substantially different than those in the Judeo-Christian West. Zimmer eloquently points out that:

"Notions of space and time are commonly taken for granted... They appear to be inevitable, colorless and unimportant; for we move through and are carried on them, as the fish by water. ...In 'timeless' India these extensive diastoles give the life-rhythm of all thought. The wheel of birth and death, the round of emanation, fruition, dissolution and re-emanation, is a commonplace of popular speech as well as a fundamental theme of philosophy, myth and symbol, religion, politics and art. It is understood as applying not only to the life of the individual, but to the history of society and the course of the cosmos. Every moment of existence is measure of and judged against the backdrop of this pleroma."<sup>32</sup>

For an architecture to resonate with the Indian cultural context, it must, by definition, recognize the cycle of the seasons. The most intriguing aspect of this study has been that no text on either climate responsive design or on Indian architecture has even suggested this connection, much less made it explicit. Years of international conferences and research addressing the problems of climate and building design establish a position from the world of science and technology and view buildings as the physical embodiment of mathematical calculations. No matter how often climate is discussed in relation to Indian architecture, it is always addressed as a building performance

issue. Simultaneously, symposium after symposium have addressed "a true architecture for India" and the issue of "Indian tradition and its role in an architecture for the future." Rarely, if ever, has climate been recognized as a cultural rather than physical factor in architecture. The chasm has remained unidentified and unaddressed.

The philosopher Karsten Harries, neither an architect nor an engineer, has spoken most clearly to this dilemma. The chasm is, for him, very clear. Harries' concern is that we have lost the ability to live as though we belong to the place and the natural world which we have chosen to inhabit. And for Harries it is architecture which holds the potential to help us regain our sense of belonging and place in this world. In his analysis, thermal comfort is part of shelter, necessary and yet not enough:

"When we speak of dwelling we think first of all of shelter. By protecting us against the weather and against strangers, shelter provides for dwelling. Not that dwelling can be adequately understood as being sheltered; we may be sheltered and yet remain homeless and displaced. This may indeed be the way most of us live."<sup>33</sup>

Architecture is a complicated act of art and science, culture and technology. To create a meaningful architecture is especially demanding, for it requires the designer to wear many hats and to understand the whole reality of a place and a people. We are most likely to approach a meaningful architecture when we recognize that we must, as designers, embrace a diversity of views and methods.

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#### NOTES

- 1 V.S. Naipaul, *India, A Wounded Civilization* (New York: Vintage Books/Random House, 1976), p. 139.
- 2 Betty Heimann, *Facets of Indian Thought* (London: George Allen & Unwin, 1964), pp.21-22, quoted in Diana Eck, *Darsan: Seeing the Divine Image in India* (2nd ed.; Chambersburg, PA: Anima Books, 1985), p. 25.
- 3 Victor Olgyay, *Design with Climate* (Princeton, N.J.: Princeton University Press, 1963), p.11.
- 4 See for example, G.Z. Brown, et al., *InsideOut: Design Procedures for Passive Environmental Control Technologies* (New York: John Wiley & Sons, Inc., 1992) and Donald Watson and Kenneth Labs, *Climatic Design* (New York: McGraw-Hill, 1983).
- 5 Benjamin Stein and John S. Reynolds, *Mechanical and Electrical Equipment for Buildings* (8th ed.; New York: John Wiley & Sons, Inc., 1992), p. 53.
- 6 Data are from on site measurements at the Indian Institute of Management, Ahmedabad, India, June 5-12, 1989 made by the author and George Loisos with a Campbell Scientific 21x data logger and weather station.
- 7 Pandit Nehru quoted in *Nature and Environment: Images Reflected in Indian Cultural Heritage* (New Delhi: Lalit Kala Akademi, 1989), p.14.
- 8 Times of India, August 21, 1989, p.1.
- 9 Monitored data from five rooftop sites in the city of Ahmedabad for selected dates between August 3 and September 3, 1989. See also note 6 above.
- 10 Olgyay, *Design with Climate*. See pp. 17-23 for a description of the Bioclimatic Chart and Chapters V - X for design suggestions.
- 11 Amos Rapoport, *House Form and Culture* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1969), p. 93.
- 12 Le Corbusier, *Oeuvre Complete Vol. 6 1952-57*, publie par W. Boesinger (Zurich: Les Editions d'Architecture, 1957), p. 114.
- 13 Louis I. Kahn, Lecture to Drexel (University) Architectural Society, Philadelphia, PA, 5 November 1968 in *What Will Be Has Always Been: The Words of Louis I. Kahn*, ed. Richard Saul Wurman (New York: ACCESSPress Ltd. and Rizzoli, 1986), p. 29.
- 14 *Sources of Indian Tradition* Volume 1, revised by A.T. Embree (2nd ed.; New York: Columbia University Press, 1988), p.264.
- 15 M.S. Randhawa, *Kangra Ragamala Paintings* (New Delhi: National Museum, 1971), p.12.
- 16 McCurry, Steve, *Monsoon* (New York: Thames and Hudson, 1988), p.10.
- 17 *Ragamala Paintings* (Lalit Kala Series Portfolio No.5; New Delhi: Lalit Kala Akademi), from Introductory Notes by Ananda Krishna.

- 18 C. Sivamamurti, *Time in Indian Art* (Bangalore: The Mythic Society, 1981), pp. 13-21.
- 19 N. Goswamy, *Essence of Indian Art* (San Francisco: Asian Art Museum of San Francisco, 1986), pp.31-32.
- 20 Alexander Frater, *Chasing the Monsoon* (New York: Alfred A. Knopf, 1991), p. 165.
- 21 Kalidasa, *The Seasons: Kalidasa's Ritusamhara*, translated by John T. Roberts (Tempe, AZ: Center for Asian Studies, 1990).
- 22 Kalidasa, *The Cloud Messenger*, translated by F. and E. Edgerton (Ann Arbor, MI: The University of Michigan Press, 1964). Also used although not quoted directly was Kalidasa, *The Megha Duta or Cloud Messenger*, translated by H.A. Ouvry (London: Williams and Norgate, 1868).
- 23 McCurry, *Monsoon*, p. 14.
- 24 *Rain in Indian Life and Lore*, ed. by Sankar Sen Gupta (Calcutta: Indian Publications, 1963), p.41.
- 25 Frater, *Chasing*, p. 92.
- 26 M. Susan Ubbelohde and George Loisos, "The Ahmedabadi Pol House: Courtyard Strategies in a Hot-Dry/Hot-Humid Climate" in *Proceedings of the Fifteenth National Passive Solar Conference*, American Solar Energy Society, 1990.)
- 27 *Agricultural Proverbs of the Punjab*, translated by Kisan Singh Bedi (Punjab: The Public Relations Department, Government of the Punjab), p. 143.
- 28 Christian Norberg Schultz, *Genius Loci* (New York: Rizzoli, 1980), p. 23.
- 29 McCurry, *Monsoon*, p. 7.
- 30 Heinrich Zimmer, *Myths and Symbols in Indian Art and Civilization*, ed. by Joseph Campbell (Princeton: Princeton University Press, Bollingen Series VI, 1946), p. 36-37.
- 31 Norberg Schultz, *Genius Loci*, p. 18. See also M. Susan Ubbelohde, "Spirit of Place: An Argument for Essay Writing to Capture the Meaning of Sun Angles" in *Proceedings of the Fifteenth National Passive Solar Conference*, American Solar Energy Society, 1990.
- 32 Zimmer, *Myths and Symbols*, p. 13.
- 33 Karsten Harries, "Space, Place and Ethos: Reflection on the Ethical Function of Architecture" (draft manuscript 1987-88).