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Ecology in Practice

Environmental Architecture as Good Design

"Most of what we need to learn we can only know from visiting the building site. The rest we can learn from Indian history and a spiritual focus."

—DR. DODDASWMY RAVISHANKAR

"To look at pre-independence buildings is to see sustainable design staring back at you."

—SUHASINI, AUROVILLE

"Take this very seriously, and remember that this whole semester is about values. You're questioning what is right. You're moving way beyond architecture."

—AR. PRITI BANDARI

It was with great anticipation and curiosity that I joined a new cohort of RSIEA students for a formal welcoming ceremony and lecture program in the winter of 2013. The full day agenda began with a film, followed by lectures from several RSIEA faculty, guest speakers, and alumni. In between, we learned some of the everyday logistics to expect from the next two years of student life, but for most of the day, our group of architects-newly-turned-students was invited to contemplate the urgency, purpose, and responsibilities that would accompany a Rachana Sansad degree in environmental architecture.

I arrived at the large auditorium in time to greet some of the faculty members and settle into one of the room's red plush theater seats. I scanned the printed agenda, a bit surprised to see a familiar film title at the top of the program. As new students shuffled into the now packed auditorium, the lights dimmed, a film screen descended, and former Vice President Al Gore quipped, "I'm Al Gore, and I'm the next President of the United States."

The fact that an infamous election defeat erased Gore's presidential aspirations aside, I wondered how a film I regarded as a standard among American environmental studies audiences might come to life in this very different context. At the

same time, I paused over the very fact that our first collective RSIEA experience, and perhaps even the framing narrative for the welcoming program itself, was *An Inconvenient Truth,* a 2006 Academy Award-winning American documentary film on climate change. I had viewed, and shown, the film several times, drawing from it regularly in my own environmental studies courses back in New York. But viewing it here, among a group of architects who were now students of the environment, gave it a curious set of new possibilities. Although useful for signaling the global-scale stakes of any kind of environmental training and action, Gore's lecture-driven, PowerPoint slide-laden film struck me as nevertheless awkward and somehow out of place. Perhaps an anthropological preoccupation with context specificity had led me to expect something that was, at least, more overtly architectural and at most, more attuned to distinctly South Asian concerns and imperatives for green design. Regional environmental predictions were dire, after all, spanning issues of future water scarcity, crippling levels of air and toxics pollution, enormous coastal populations vulnerable to sea level rise, and massive and expanding socioeconomic inequalities. This is not to say that I hadn't expected program presenters to invoke global climate change, but rather that locating its narrated starting point with a film made famous in part for the role of a former American vice president seemed surprising to me, but quite natural to the audience I sat among.

The film outlined a historical narrative of global environmental awareness that I myself had invoked often when I taught in the U.S. From our auditorium seats, we gazed together at *Earthrise,* the stunning 1968 Apollo Space Mission photo of Planet Earth, followed by the even more ubiquitous *Blue Marble* Earth photo taken from Apollo 17. These images, and the historical moment of consciousness-raising they had come to index, drew us toward an imaginative leap from our physical places in an auditorium in Prabha Devi, and the city of Mumbai, to conceptual scales of larger regions and even larger global landscapes. *An Inconvenient Truth* portrayed just that: a scientifically coherent set of interlocking biophysical systems that were under dire and intensifying stress; these would require dramatic reorientations in politics, economies, and policies to alleviate. We all had a place in the reorientation process: salvaging the global future from the ravages of climate change would involve not only science, but also collective acts of consciousness-raising, environmental stewardship, and decided ecological engagement. From the center of this narrative, it was difficult to differentiate between the global, universalized planetary risk the film emphasized, and the deeply heterogeneous social and geographic texture of the localized threats that climate change posed. To commence our RSIEA experience by focusing on this planetary scale afforded a temporary entitlement to think beyond the messiness of places, including the place in which we sat, transfixed, and watched. When the very future of an aggregated humanity was suspended in the balance, the intricacies of Mumbai's political and social environment—or any of the city's specificities, for that matter—seemed almost a decadent luxury to consider.

The two-year course began, then, with what might be regarded as a conventional, Western-centric, undifferentiated narration of environmental belonging and responsibility: human beings inhabit a common planet, share a common future, and depend on a biophysical context more vast and complex than any scale at which we live individual or everyday social lives. To situate the question of responsibility for having caused, or for perpetuating, climate change across a continuum attuned to historical circumstances and power relations seemed to miss the global point, and its attendant moral imperative.

An Inconvenient Truth surely had another possible effect. By opening the RSIEA program with a film so fixed on the global scale, the faculty conveyed to new students that the curricular agenda would prepare them to assume a legitimate place in global circuits of knowledge, data exchange, and organized responses to environmental change. An RSIEA degree would activate more than locally situated expertise; it would prepare its environmental architects to navigate the global arena of green expertise.

But the lights came up and quickly drew us firmly back into place. A guest visiting professor in that term, Dr. Doddaswamy Ravishankar of the Indian government-owned Housing and Urban Development Corporation, stood before us at the prominent if age-worn podium. Behind him the screen that just moments before had led us to imagine the vast universals of planetary scales now read simply, "The Morality of Sustainability." As if to balance the blue planet image with an equally galvanizing regional narrative, he quickly clicked the keyboard to summon a new slide. It recited a familiar passage:

> I have traveled across the length and breadth of India and I have not seen one person who is a beggar, who is a thief. Such wealth I have seen in this country, such high moral values, people of such caliber, that I do not think we would ever conquer this country unless we break the very backbone of this nation, which is her spiritual and cultural heritage, and, therefore, I propose that we replace her old and ancient education system, her culture, for if the Indians think that all that is foreign and English is good and greater than their own, they will lose their self-esteem, their native self-culture and they will become what we want them, a truly dominated nation.
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> Lord Macaulay's address to the British Parliament, February 2, 1835[1]

In an instant, India's distinctive historical experience of European colonial expansion, and Mumbai's particular political and economic conditions under the British Raj, flooded back into the picture. Ravishankar's aim was not to ponder the authenticity or ubiquity of the quote, but rather to remind his audience that the anthropogenic origins of climate change were not embedded in a uniform global history of burning fossil fuels; its very emergence depended on extractive and exploitative global political economic patterns that were themselves administered according to specific values and moral sensibilities. The very stuff of Enlightenment notions of progress—the Industrial Revolution, the extractive networks and trade systems

through which it expanded, and the modern history of development across the postcolonial world, were all quite unevenly implicated in the global environmental conditions of the present. While at the planetary scale we might all share future consequences quite likely to be indifferent to which communities are more or less implicated in its cause, he suggested, it may also be the case that the political economic circumstances within which climate change was enabled had left us distracted from certain historically practiced or known alternatives. If it was through the colonial and twentieth century postcolonial political economy that the present crisis was forged, then the ecological distortions that came in its wake were inextricably tied to historical processes of erasure, domination, and in Ravishankar's framing, a loss of the very "thing" that made those in the room collectively eligible to claim the identity of *Indian*.

An educational undertaking like RSIEA, one that would draw part of its content from regionally-specific built forms and ideas that long predate India's colonial experience, thus began to situate itself in an explicit accounting of the responsibilities that students might consider distinctly "Indian" or unique to "Indian" cultural identity in an era of climate change. From this vantage point, Ravishankar implied, the environmental architect in India would learn the scientific language associated with the scale of the Blue Marble, but also proceed with an eye toward recovering the situated past; such a recovery was essential if we were to redirect the environmental future. We were in Mumbai, after all, a city whose contemporary built landscape was woven with the remnants of textile manufacturing and the laborer housing that characterized much of the later years of colonial rule there. Beyond the transforming millscape, the city was richly animated by grand, iconic structures that daily retold the history of the city's colonial social and spatial order. The meeting point of planetary environmental stresses and appropriately "Indian" remedies, according to Ravishankar, would thus partly lie in the architectural work of historical reclamation. Though the room was packed with students from a complex array of backgrounds, the cultivation of their collective identity as *Indian* environmental architects had clearly begun.

"These days in India we have money and technology, but what is lacking are the institutional mechanisms to create sustainability," he continued. These were not foreign to India, he assured us; rather they were deeply ingrained in regional history as ancient and indigenous. A sustainable sensibility need not be imported, he lectured: "We need only look to our own past." Repeatedly appealing to the importance of "maintaining our integrity," Ravishankar told students that the long history of "imported, Western ideas of sustainability" exposed it as "hypocritical" and profoundly incomplete. Western building practices denied "a place for the intrinsic spirituality of sustainability. It is Western nations that should be looking to *us* to learn about sustainability; it is only India that can teach them inner growth." Ravishankar underscored his powerful point by invoking this supposedly innate, essentially "Indian" understanding of the intersection of spirituality and sustainability.

With those in the auditorium riveted, Ravishankar narrated a sharp reversal of the colonial calculus of power and dominance: perhaps we were not only here at RSIEA to bring Mumbai, the region, or the country into compliance with a global trajectory that would reverse climate change. Perhaps the promise of Indian environmental architecture was its power to reorient historically dominant moral ecologies as well. Assuring the audience that the foundational ideas of sustainability were present in ancient Hindu texts, he said, "most of what we (environmental architects) need to learn we can only know from visiting the building site. But the rest we must learn from Indian history and a spiritual focus." An implied conflation of "Hindu" and "Indian" continued as a discursive automatic, leaving open the question of whether and how the various origins of those historically "Indian" traits we would study as sustainable would include the region's far broader, more diverse religious and ethnic attributes. But for the moment, the larger point was clear. Training at RSIEA would not involve the uncritical absorption of globally circulating metrics, techniques, or narratives of ecological dysfunction. It would expose students to these, but demand in addition the contextualizing skills to accept, adapt, or reject them as valuable, as "Indian." The stakes were global, but the tactics would be profoundly local. Ravishankar departed to enthusiastic applause, and the group sat chattering long after the house lights came up and summoned us to a tea break.

A bit later, reassembled in the auditorium, another speaker, a representative from Govardhan Ashram, addressed the group. This particular semester, RSIEA would conduct a weekend study tour at Govardhan—a sort of "test run," the program head told me, to determine whether the ashram was an effective location for staging some of the program's experiential curriculum. More details of that study tour and the ashram itself await in a later chapter, but in the context of RSIEA's welcoming ceremony and following Ravishankar's impactful declaration of the role of Indian "spiritual focus" in environmental architectural training, the appearance of an ISKON ashram spokesperson hinted toward a very specific rendering of the form that "spiritual" might take.[2] At a time when India's Hindu Right was gaining political strength and dominance, it was difficult to reconcile the diversity of the new student body and RSIEA faculty with repeated references—both overt and implied—to Hinduism specifically and a conflation of spirituality and environmental thinking more generally. Would contextualizing environmental architecture for "Indians" automatically invoke shades of Hindu nationalism?

The focus on spirituality faded from prominence, however, as a set of lectures focused more directly on retelling aspects of the urban planning and development history of Mumbai. Mishkat Ahmed, an architect and urban planner based in Mumbai, gave a talk that invoked the case of Navi Mumbai, the planned township area northeast of South Mumbai, to explore how development plans might address socioeconomic asymmetries or certain social and environmental questions. She focused heavily on the well-known Indian architect Charles Correa,

who played a central role in conceptualizing and advocating for Navi Mumbai. Ahmed used Correa as a more localized counterpoint to the global figure of Vice President Gore, reifying his prominent place in the regional planning imaginary. But she also echoed the previous talks insofar as the emphasis on Correa allowed her to directly relate responsible action vis a vis the environment to "Indian" ideas and practices.

Though Correa's reputation as an architect-activist has been exhaustively debated, the content of those debates was rhetorically less important in this instance than the invocation itself: here was a figure quite familiar to RSIEA students whose efforts in the case of Navi Mumbai could be used to reinforce the idea that environmental architecture and the idea of an Indian moral ecology were logically connected.

In some ways, there was nothing necessarily new in these repeated discursive linkages between Indian "traditional" architectural knowledge, a generalized notion of Indian identity, and socioecological problem solving. There was also little new about drawing on Charles Correa to substantiate such claims. At least since the 1980s, conventional transnational architectural discourse about Indian identity:

> inevitably considers architecture as an agency historically influenced by, and capable of influencing or solving, future social and cultural problems and challenges perceived to be a given in Third World situations. By not so complex translation, hence, such architects are then promoted variously as visionaries, cultural messengers, or as Charles Correa is considered, an "activist" of such a necessary and radical change.[3]

But what was perhaps notable here was the recurrence, in this earliest experience as a collective of RSIEA students, of claims to the transformative, almost agentive power of activating "Indian" identity in the context of contemporary environmental architecture. The vast contents of both would emerge across courses, field experiences, and collective engagement, but our starting point reinforced the notion that responsible environmental design could only derive from a specific, Indian historical rigor. Over time, the curricular case for this would build for individual projects and their pasts, but also for deeper patterns of power relations and social organization. The experiential field visits I detail in a later chapter were a key arena for this.

Invocations of simultaneous global belonging and regional historical specificity thus traced a discursive arc that began with the moral urgency of global climate change but concluded with tellings of the contextual, and even individual, lifeworlds of Mumbai's situated architects. In both starting and closing the opening program, the leap from environmental architect to activist was in fact no leap at all.

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Environmental architecture's moral imperative thus framed, its contents—as the concepts, design techniques, and architectural technologies that constituted "good

design" at RSIEA—would be its essential building blocks. In the weeks and months after the opening ceremony, I reported daily to RSIEA to attend classes, travel with students on field study and project excursions, and puzzle over occasional assignments. According to Dr. Joshi, the founding faculty member introduced previously, even as modifications to the curriculum "updated" course content, hybrid teaching strategies and methods were an enduring ideal:

> When we started, (we emphasized) . . . more of the classical things like recycling and reusable materials and how the environment works. Then right from the beginning we (took) students to live projects. And now we want to do this even more. Taking them to places like Auroville, water treatment plants, or to different buildings where innovative materials like compressed earth blocks are used . . . this shows them examples of how it's done and that is central. In fact, in the new curriculum there's more of that now. And we try to give assignments to students that emphasize self study. We give them guidance but we make them study the topics on their own; then they do the presentations to their class of twenty students. If each one takes a topic, they cover lots of ground on their own, and they get presentation practice and experience . . . They also get the confidence to explain the concepts to others. They will need to be able to do this with clients, so they start here.[4]

The "environment" in environmental architecture was thus gradually defined through a combination of problem-oriented field situations, such as how to derive locally-sourced and ecologically sound building materials in a place like Auroville, and the more conventional recitation of lecture and course material that presented a mosaic of knowledge forms from the biophysical sciences, technology and policy studies, and a cultural history of built forms and "sustainability" in India. Experiential field learning on study tours and field projects gave students a chance to try to apply their newly acquired integrated knowledge in practice.

Throughout my fieldwork, the curriculum was structured so that students studied these themes simultaneously; courses might emphasize specific material and proficiencies in science, policy, design techniques, or technology, but most felt deeply integrative, cross-referencing and mutually reinforcing one another as students progressed through them. Two versions of the curriculum are relevant here; as the program was transitioning between old and new syllabi, I experienced both rubrics. From the student's perspective they were fairly indistinguishable, class titles and topical emphases shifted slightly in the transition.

In the original curriculum, the biophysical scientific basis of environmental architecture formed a foundational starting point. Instructors used a systems approach to living organisms, the physical environment, and the flow of energy to convey a basic definition of ecology across four courses—Introduction to Environment and Sustainability, Disturbances and Remedies, Urban Ecology & Environmental Management, and Environmental Services Management Systems. In these, terms like "ecosystem," "ecology," and "sustainable" signaled scaled units of human and nonhuman elements in patterned, usually quantifiable interactions.

Following assumptions generally associated with mid-twentieth century models of, and assumptions about, ecology, these interactions were then assumed to beget defined trophic structures, to reproduce biotic diversity, and to host the constant exchange of materials across units and within different parts of any given unit. In tracing these exchanges, and defining the relevant scaled unit boundaries, ecosystems could be designated—either conceptually or in the practice of engaging a site for architectural design. This approach echoes definitions grounded in Odum's 1953 work, *Fundamentals of Ecology;* its core concepts—like order, mutualism, and cooperation in nature, an assumed trajectory in the nonhuman world toward "balance" or homeostasis, and its focus on communities of living organisms in constant interaction with physical environments—resonate with the implied and overt definition of "ecosystem" that was formally and informally imparted in the four ecology courses and onward through the curriculum.

A definition of ecology derived from this specific version of systems science mapped most directly to the lectures and readings for Introduction to Environment and Sustainability. Here, students read aspects of Odum's *Basic Ecology* alongside several other reference texts, including *Environmental Science: the Way the World Works* by Nebel and Wright and *Modern Concepts of Ecology* by H.D. Kumar. This course introduced and defined "sustainability" as a logical counterpart to the working definition of ecology; drawing from a collection of texts that included works considered to be classics of the mid-twentieth century Western environmental movement (such as Rachel Carson's *Silent Spring,* Jane Jacobs' *The Nature of Economies,* and *The Gaia Hypothesis* by James Lovelock), as well as publications by Rashmi Mayur (the figure discussed previously who had first inspired RSIEA's Head, Roshni Udyavar Yehuda), the course constructed an almost seamless conceptual relationship between functional, vital ecological systems, and "sustainability."[5] In a way that echoed the opening session, it also placed an Indian figure, Mayur, in a prominent place among North Americans often invoked when sketching the mid-twentieth century rise of Western environmentalism.

This conceptual rubric conveyed an interrelationship between "ecology," used as a frame for explaining *how* the environment works, and "sustainability" as a metric of its vitality and value. Human life, particularly in the concentrations and numbers we experience in the historical present, was reinforced as the source of inevitable environmental disturbance, and the challenge to the environmental architect was framed as the mitigation of adverse impact. Maximally functional nature—free of human-induced disturbances—was fully desirable, sustainable, and good in this framing. Here emerges a preliminary guideline for understanding the frequent use of "good design" as the aim of both the RSIEA environmental architecture curriculum and, once trained, its responsible practitioner.

Fundamental biogeochemical cycles like the carbon cycle, water cycle, and nitrogen cycle were covered over multiple courses, and their influence on the built environment, as well as the reverse, conveyed through principles of conservation

and efficiency as applied to space, energy, and material resources. These principles were an additional core focus of Introduction to Environment and Sustainability, and they were repeated across the curriculum in terms of ecology as a problem in which "disturbances" must be identified and "remedies" devised.

To elaborate this logic, the course called Disturbances and Remedies was designed as a compliment to Introduction to Environment and Sustainability. Here, the guiding conceptual principles derived from standard environmental impact assessment models; core texts include Canter's *Environmental Impact Assessment,* P.K. Gupta's *Methods in Environmental Analysis,* and Biswas' *Environmental Impact Assessment for Third World Countries.* Following Joshi's narration of the RSIEA program's origins, the focal disturbance for this course was pollution, disaggregated into physical, chemical, and biological expressions. A central concept here was that specific social characteristics can help to maximize ecological vitality, and certain aesthetic, cultural, and social disturbances can distort it. The architect might find those social dimensions difficult to define and clearly problematize, but the physical, chemical, and biological aspects could be measured and managed as air, water, solid waste, and noise pollution. The course introduced students to fairly standard—that is, internationally consistent—technical procedures for remediating pollution. By studying environmental impact assessments and disaster management plans, students were further encouraged to consider their potential role as architects in mitigating pollution, and therefore maximizing "sustainability."

In the following semesters, two courses built on this foundation: first, Urban Ecology & Environmental Management applied the concepts to urban agglomerations. In four units, students study Environmental Problems of Cities, Mobility and Infrastructure, Environmental Planning & Disaster Management, and Urban Hydrology. Reference texts such as *Integrated Land Use and Environmental Models, Cities for a Small Planet,* and *The Gaia Atlas of Cities: New Directions for Sustainable Urban Living* underlined a central message that the inevitable ecological disturbances associated with human settlements in previous courses automatically multiply in scale and intensity in cities. One of the greatest challenges to the environmental architect, then, is environmental architecture in cities. "Urban" was usually used interchangeably with "city," but as the program proceeded, students were encouraged to notice the ways that natural resource flows and movements of labor, capital, and information rendered an urban continuum between city and countryside.

Finally, a course in Environmental Services Management Systems presents techniques for managing water, solid waste, and landscape flora. The emphasis here is a menu of internationally available technologies, but also modes of assessing each technology's appropriateness and feasibility in context. India's specific experiences with technologies considered "appropriate" or "inappropriate" are underlined with reference texts such as Agarwal and Narain's Dying Wisdom: the Rise, Fall, & Potential Wisdom of India's Traditional Water Systems, and a heavy

emphasis is placed on decentralized, small-scale techniques like the DEWATS (decentralized wastewater treatment) system used in Auroville and the rainwater harvesting systems most commonly used in southern India.

The reader may notice the dated nature of many of the course reference texts, as well as their grounding in both late twentieth century Western environmentalism and in some of the so-called "Global South" voices that challenged and revised its assumptions of political neutrality and universality. Some texts also mark a place in global debates between environmentalists that have played out for decades, such as the relative appropriateness of rubrics like the Gaia hypothesis.[6] In general, the point of the RSIEA ecology course series was not to expose students to the latest scientific papers on urban ecosystems, or even to elaborate their understanding of ecology principles by introducing the many significant revisions to the science that have punctuated recent decades and continue to change in real time. As a consequence, many basic conventions of contemporary ecology—including heterogeneity, patch dynamics, disturbance ecology, theories of chaos and other historical challenges to the very notion of homeostasis—go unstudied.

It is thus critical to underline that the RSIEA curriculum does not profess to create ecologists or environmental scientists. Its curricular structure does not invite students to undertake rigorous scientific inquiry beyond core concepts of systems, interconnection, and basic energy and nutrient cycling. Instead, the ecology courses are integrated into the rubric that Dr. Joshi called "the big picture;" it organizes particular definitions of environmental stresses, impacts, and problems. Ecology is in this sense closely related to the paired discursive metrics of relative "sustainability" and "good design." Readers should not interpret RSIEA's ecology courses as a pedagogical attempt to teach what disciplinary specialists would identify as the "state of the art" in the dynamic ecology subfield of urban ecosystem ecology. To the contrary, the meaning and content of ecology here was rendered in the curricular experience itself; it signaled a modality of interconnection and unity in which anthropogenic built forms and their socionatural context were expected to produce particular, new socioenvironmental contexts. The goal of "good design" was to minimize "disturbances" and to maximize a generalized environmental vitality. Such an approach to ecology necessarily lifts systems science and systems thinking out of their own temporality and dynamism; in so doing, ecology for RSIEA environmental architects was rendered as a frame with specific diagnostic, relational, and functional attributes. The dynamism of those attributes followed a very different temporality and trajectory than other social renderings and practices of environmental expertise.

The curricular transmission of ideas of a science called ecology to a technical practice called environmental architecture should not be understood as a linear progression from a domain of knowledge, in this case ecology, to its operationalization, in this case environmental architecture. As social practices, or as different forms of ecology in practice, both the science and the architecture involve

the production of specific kinds of knowledge, validated and reinforced by their respective audiences. In this sense, it is somewhat misguided to interpret RSIEA environmental architectural practice as somehow failing to incorporate "actual" ecology—a critique that might arise from a perspective that seeks an active operational domain for scientific ecology that is directly connected, in real time, to the changes and innovations always happening in that field. Research in science and technology studies, following the foundational work of scholars like Latour and Jasanoff, has repeatedly shown that fields of scientific knowledge production are also fields of expertise, epistemological domains in which the practitioners of a given form of expertise are technicians; their work involves a constant negotiation between the political and technical spheres.[7] The knowledge that is legitimated in each arena is rendered for, and affirmed by, specific audiences that are deemed qualified. In the case of RSIEA, then, it was within the Institute itself, and in the social experience of training, that the specific form of green expertise called environmental architecture was made and remade, verified and re-verified.

It is also the case, however, that the foundational assumptions and assertions that came to stand for ecological knowledge in RSIEA environmental architecture were derived from a knowledge domain regarded as authoritative and legitimate; the contemporary scientific ecologist might read those foundational assertions and contest whether they are rightly "ecological" at all. They are, undeniably, considered out of date in scientific ecology.

The curricular content at RSIEA thus outlined its own definition of what ecology meant for an environmental architect, identifying the technical details through which her expertise would be assessed, and the audiences and networks to which that expertise would be held accountable. An impulse to distinguish clearly, or draw a fixed connection, between ecosystem ecologists and environmental architects risks losing sight of the distinctly different temporalities, knowledge forms, and legitimizing audiences that shape their practices and compose the networks to which those practices and their agents are ultimately held accountable.[8] The epistemological domain of the "environment" in RSIEA's form of environmental architecture was therefore produced in the social experience of the curriculum, the interactions through which it was conveyed and contested, and ultimately, in its practice as a form of green expertise. In that domain, an environmental architect was assessed by the extent to which she practiced good design, not her expertise as an ecologist, biologist, chemist, or any other natural science discipline.

Of note here is not only the ways that conceptual borrowing between fields can also redefine or temporally freeze the concepts themselves, but also the temporal hybridity of RSIEA's particular form of green expertise.[9] Contemporary green architecture at RSIEA built upon historical notions from ecology, but inside the arena itself, it was precisely those elements that helped to transform conventional architecture to a practice that could take on the challenges of the present.

Having worked through its key ecological content, the remaining curriculum addressed environmental disturbances and mitigation techniques. Ravishankar's opening day assertion that "most of what we need to learn we can only know from visiting the building site" echoed through a strong curricular emphasis on the importance of knowing the experience and physical aspects of a given building site, even if a team of disciplinary specialists might be needed to fully understand them. In specific circumstances, design considerations like building placement and orientation, climatic context, and the availability of recycled or reusable resources were shown to facilitate strategies for minimizing built form impacts; these could be combined with available technological tools to enhance an architect's accomplishment of "good design."

An instructive example of RSIEA curricular treatment of architectural impact and mitigation can be drawn from a session called Green Home Technologies, which was part of the week-long course sequence our group undertook in Auroville. As I will describe in more detail in a later chapter, the annual RSIEA study trip to Auroville is by far the most popular among the several field study programs offered at RSIEA; it played a central role in the experiential reinforcement of many facets of the in-class curriculum.

Auroville hosts a variety of environmental architecture experiment sites, and enjoys an international reputation for a certain kind of experimental architecture. A RSIEA faculty member described the city to me as the "epicenter of sustainable architecture in India"; indeed, the popularity of the so-called sustainability science trainings it offers to visitors attests to national and international renown. This endures, despite Auroville's reputation in other areas as something of a relic of mid-twentieth century countercultural utopian idealism.

The city maintains a close connection to the Sri Aurobindo ashram, and its foundation in the spiritual philosophy of Sri Aurobindo suggests the kind of hybrid attributes to which Dr. Ravishankar had gestured on opening day. In fact, what Ravishankar might call Auroville's "spiritual focus" is a complex product of a historical movement associated with the ashram in nearby Pondicherry. Housing roughly two thousand people, the city was founded in 1968 by the followers of Sri Aurobindo and Mira Richard (known more commonly as the Mother); the latter had called upon devotees to create Auroville in a guise that would allow it to become, as its explanatory literature espouses and its residents repeat, "the city the earth needs." I shall engage this mission more fully in a later chapter, but for the moment let us return to a curricular experience of learning the definition of "good design."

Our instructor for the Green Home Technologies session introduced herself by only her first name, Suhasini—a practice consistent with all of the instructors who led our varied courses and workshops. Trained at the Delhi School of Planning and Architecture, Suhasini is a partner in the Auroville design and planning firm AB Consultants. She is also an Auroville resident, or "Aurovillian." Her welcoming

remarks framed Auroville as a generative place "where architects can try things out, experiment, and research."[10]

Suhasini opened her lecture by suggesting that the aspiration to practice environmental design generates a tremendous sense of pressure. A commitment to it seems to imply the need to take on many different goals simultaneously, she explained, and to meet them all in every project. Suhasini cautioned against this, assuring us instead that "it is not necessary to do everything all the time everywhere," adding, "there are certain technologies that are only sustainable in particular circumstances." She offered an example: an architect designs a water recycling mechanism for a building located on a site with a high water table. "This is totally unsustainable, even though it sounds great to say the building recycles its own water," she said. Following this logic, her guidelines for "good" design emphasized that it is sometimes counterintuitive. Rather than trying to maximize the number and types of environmental interventions in a single design, she said, "consider the context and do more with less. If you are doing *these* things carefully, you're on your way to good design."

Suhasini then outlined a clear map of principles for good, or as she continued to call it, "green" design. The first element was "minimize everything." "Everything" encompassed needs, design interventions, and special engineering techniques. "Try not to add to the problem, but rather, be the solution through your intervention." Second, "work in terms of multiplicity of function." Here, guidance centered on maximizing the possible utility of a given space in order to avoid "the unsustainability that comes from the lack of intensive use." Third, "design for all aspects of climate." Suhasini linked this to a concept of "biological harmony" that signals minimal "stress" to occupants inside a built structure.

The next point followed: "design for durability and longevity." Avoid creating excess construction waste, since this is usually dumped in ways that are harmful to the environment. As an instructive example she cited a nearby bird sanctuary that doubled as a clandestine repository for construction debris. "The problems that follow this dumping will be with us for decades to come," she cautioned. Astonishing quantities of PVC and steel lie in heaps across the sanctuary territory, "plus the materials themselves are lost to us. We can't use them once they've been dumped." The desirable alternative is to select materials that use base resources efficiently, and "one way to do this is to choose materials not because they are the easiest to procure or the most familiar to use." To justify this as good design, Suhasini invoked the past, noting that, "pre-independence, materials were procured from a 25–50 kilometer radius; notice that to look at pre-independence buildings is to see sustainable design staring back at you." Noting that different products have different energy inputs and pollution effects during their own production process (the idea of embodied energy), she advised the group to consider the toxicity of new materials and to seize any opportunities to recycle. "We would not be where we are without cement," but its high carbon unit cost makes it one of

the most polluting industries. "Beware," she cautioned, "of materials that don't age, show stress, or need maintenance!"

Suhasini continued to offer more precise ideas of "green" design by describing her own style of professional practice. Begin by valuing the ability to cooperate, she said; "the days of the master architect and his minions are lost; none of us wants to be a lab rat anymore. Therefore team playing is essential!" Invoking the past once again, she continued:

> Very often what architects have become is service providers. But historically we are not this. We were people who made changes. We have become the last guys in the pipeline, not influencing clients and users as we should. Remember that architecture is a profession that is more than a service. We have a say, and we have to be responsible for it. We need to be there as projects are being formulated . . . (and use our) position of tremendous influence.[11]

The lecture concluded with a reflection on what the architect can hope to achieve in practice:

> We are not so delusional as to say we will achieve sustainability. We have to design in a way that enhances sustainability. Do this with appropriate built forms, materials that are local, harmony with climate, and the goal of capturing and reusing available resources. Avoid producing hazardous waste. Avoid all waste. Aim to enhance sustainability.[12]

With that, we were left with a buoyed sense of the agentive capacity of environmental architects—on an individual basis and as active participants in cooperative units. Suhasini's elaboration of good design concluded precisely at the point of our potential, one we may have lost sight of in the present, but which, according to her invocation of the past, had strong and inspiring precedent. It seemed unimportant to our group to discuss the structural parameters in which she worked, or the peculiar economic and bureaucratic apparatus that facilitated and oversaw architecture and development in Auroville. The agentive potential Suhasini invoked suggested that all good design can transcend the confines of specific social structures. Obstacles or perceived limits, in this formulation, were no match for good design in practice.

. . .

Back in the Prabha Devi classroom, the broader definition of good design always suspended at least partly in the sociality of its making, RSIEA students move from courses that define the biophysical principles of ecology to those intended to convey a "toolbox" of strategies, technologies, and metrics to supplement their craft. In the new version of the curriculum, the main courses in this cluster are Sustainable Building Design Principles, Sustainable Building Materials, and Thermal Comfort and Passive Design.

FIGURE 4. A team of RSIEA students prepare a topographical map of the Pali field study site. *Photo by the author.*

Sustainable Building Design Principles is organized according to the formal themes listed below; these reinforce previous courses in which ecology was defined and notions of balance, harmony, interconnection, and homeostasis are associated with sustainability. The themes supplement this notion of the relationship between ecology and sustainability by introducing a history of the international, Western, and Global Southern environmental movements of the twentieth century. The course includes exercises in thinking across scales and contexts, as well as the idea of carrying capacity for habitats.[13] The final thematic cluster of the course introduces quantitative approaches to assessing relative building efficiency and the ways these are aggregated to form various international indices of sustainability. The curriculum lists these themes:

1. Understanding the term sustainability: sustainable development an overview of report of Brundtland commission formerly the World Commission on Environment and Development (WCED), Earth Charter and other summits by United Nations. Brief history of sustainability from agrarian communities largely dependent on their environment, western Industrial Revolution tapping vast growth potential, advances in various fields, environmental movement and energy crisis in 20th century, to increasing global awareness—greenhouse effect, etc. in the 21st century, global treaties & action plans.
2. Sustainability principles and concepts- scale and context: over many scales of time and space: environmental, human, cultural, social, technological social & economic organization.
3. Total carrying capacity of Planet Earth; extent of biological and human activity or part of it. consumption-population, technology, resources: destruction of

biophysical resources & Earth's ecosystem, environmental impact, complex ways in which resources are being used; renewable resources; resource management in economic sectors, manufacturing industry, work organizations etc. Attempts to express impact mathematically.

4. Measurement: measurements used as the quantitative basis, metrics used for measurement of sustainability, indicators-benchmarks-audits-indexes, accounting-assessment and appraisal-measures of reporting sustainability-environmental sustainability index and environmental performance index.[14]

The experience of classroom sessions and lectures affords another window on the making of good design expertise at RSIEA. In Dr. Doddaswamy Ravishankar's winter 2010 course Design Principles, he opened one typical lecture by asking students to brainstorm how the term "green" applies to building materials.[15] "What does it mean?" he asked, poised at the blackboard with a piece of chalk in hand. "Low consumption!" said one student. "Conserve energy," offered another. A third added, "biodiversity." Lines filled the blackboard: recyclability/biodegradability of a material; less embodied energy; low emissions/low waste generation; non-toxic.

Pausing the exercise, Ravishankar asked students, "Now, how would you organize these into a green materials protocol? If we have to make this list into something we can use to choose the right materials for green building design, how would we do it?" The students stared back, some seeming to reflect, while others were simply puzzled. After a few moments of silence, Ravishankar suggested a parallel list of questions to guide materials choices:

> I would organize it according to a set of questions: what are the exclusions? Meaning, are there thresholds or laws about the material you're considering? And then, what are client's preferences; do they desire a more energy efficient building? What about the benchmarks for all the building inputs and outputs . . . how much water consumption are we talking about, for example, and how does this material relate to our goals? Now, how about the management system? Is there some way that a materials manufacturer maintains consistency, like through a monitoring system or certification? What about disclosure—how transparent is the story of how this material is made? Then you want to ask about the material's compliance with environmental and social expectations . . .[16]

The instructor then identified a host of international organizations and their websites; each, he said, offered useful examples of how to organize a materials protocol. Mapping the world as he composed his list, he encouraged students to study the APO Tokyo Eco-products Directory. Here they could explore how the organization mapped the life cycles of various building materials. He pointed to the German Wuppertal Institute for its database of embodied energy in common building materials. Coming to the case of India, Ravishankar emphasized the absence of an Indian standard for, or even clear definition of, biodegradability. "Here, you run into formal definition problems every time you consider a green

building criterion," he said; "when it comes to India, try to get beyond the criteria and use your common sense."

Building on the materials protocols to which he had referred, Ravishankar introduced the idea of the Sustainability Assessment of Technology, or SAT. These protocols, developed by the International Environment Technology Center of the United Nations Environment Programme, are often considered the most integrative because they incorporate environmental, social, and economic measures of performance and acceptability.[17,18] Claiming a term from green capitalism and marketing, he called these criteria the "triple bottom line."[19] As an example, he raised the idea of "local" materials sourcing, noting that this suggests environmental benefits, but it also might connect to social and economic capacity-building at that same scale. "Beware, though," he cautioned; "never interpret the SAT as a matter of scoring. Use it to remember that linking materials or technologies to social well being is always important."

The world map of examples continued. Ravishankar introduced the international Environmental Products Declaration system administered from Stockholm, and encouraged students to visit the website of the American Institute of Architects, as it had just held an important exhibition on embodied energy in building materials.[20] The list of transnational protocols continued to grow. The International Environmental Technology Center of the UNEP offered a useful consolidated fact sheet on materials, while the national materials rating systems in Germany and Austria had "some of the best rating systems." As the class period came to an end, the blackboard was scribbled with lists of websites, international protocols, and examples from elsewhere, and the promise that by the end of the semester students would develop their own grasp of the menu of materials available to them, and a wide range of approaches to assessing the relative sustainability of each. Most importantly, they would be able to develop their own guidelines, appropriate to the Indian case, particularly drawing from, as Ravishankar stated, their "common sense."

In addition to familiarizing us with a vast array of considerations when it came to building materials choices, the protocols exercise had the effect of conceptually reconnecting our aspirations to practice environmental architecture with a wider transnational community of institutions and their associated metrics. Charting the many tendrils of a global movement called environmental architecture—here, by mapping the contours of its protocols—only reaffirmed the importance of good design expertise on the global scale. With the Indian context as our anchor, we were nevertheless guided across the global landscape of guidelines that shaped good design expertise beyond our sphere of practice. Here was another dimension of the hybrid knowledge form being forged in the social experience of training: our expertise was affirmed at multiple scales, and the need for it was as global as it was "Indian."

Just after this lecture, my hand sore from scribbling protocols lists in my notebook, I moved along with the students to the next course, Thermal Comfort and

Passive Design. Shirish Deshpande, our lecturer, greeted us and launched directly into a deceivingly simple question. "Which is greener," he asked, "GRIHA or LEED?" These two metrics for assessing the relative sustainability of a given built structure automatically posed an Indian protocol against one that circulates internationally, and as such, is sometimes regarded as a global standard.[21]

Deshpande paused, and then began his response. "Any code that is pushing toward a new baseline—that is continually pushing the envelope, so to speak, is good." Again, the case of India became the exclusion: he cautioned that LEED requirements are based on very specific models that often depend on data and product availability not immediately applicable to India. "These are standards developed in the U.S., so naturally they are not always appropriate for India," he said.

But the question had opened another point, to which Deshpande devoted much of the remainder of the class session. "You know," he began, "It's better not to look at the credit systems only; look at the intent, and start with your design. What do you want to achieve?" Environmental architects must follow a conscious design process, he explained, not just proceed according to scoring from a list of points or credits. "But Sir," a student replied, "even if the client is not asking for a green building, we can design it in this way." Yes, was the reply; *this* is good design. "If you forget about the credits and just think about good design you will automatically have a good building. And you will teach the client that it is smarter than racking up points." Good design, then, demanded an agentive stance: it implied both the capacity and the responsibility to "teach" the client, and it demanded that the architect work with, but move beyond, the procedures that followed from protocols and codes. Practicing good design was not following a recipe; it demanded, in fact, the opposite stance.

The central theme of Deshpande's session that day was the importance of using standard metrics as "tools for checking and reference," but never as guidelines. To elaborate, he gave an example: differentiating between COC (costs of construction) and OC (operating costs), Deshpande supposed that a "typical Mumbai building" carries normal construction costs across a range of INRs 1,700–2,000 per square meter. A student quickly offered that "building green" would increase the cost to at least INRs 2,400 per square meter. "Can we reduce this first cost?" Deshpande asked. "How can we capture and convey to the client that there is a payback in the long term? If we start from the notion that the first cost of good design will always be higher than conventional design, then we will never do green work."

Despite what seemed to be an obvious impasse born of economic realities, the instructor pressed on. "Be creative," he urged. "What if you, as the architect, just give it a (cost) cap? What if I say design a green building and keep the cost down to INRs 1,200 per square meter? Could you do it?" The room was silent. "It's up to you, the architect. You can take the lead in making good design decisions." No obstacle, he implied, even an economic one, should be stronger than good design.

In both sessions, Ravishankar and Deshpande ascribed almost infinite potential agency to individual Indian architects armed with good design; the moral

imperative then rested with each student to simply perfect and employ it. To fail to do so signaled, in large measure, the weakness of the architect alone. The suggestion that one can design one's own materials protocol whilst proactively consulting a full range of international metric tools was at the core of Ravishankar's blackboard laden with lists, while Deshpande left students with the clear directive "It's up to you." If a process seemed too expensive, the architect could make it affordable. Metrics and protocols were heuristics rather than guides. "You can take the lead," Deshpande assured them, and the power seemed to rest with the hybrid expertise of good design. Suhasini's lecture back in Auroville was not only echoed in the classroom, then; it was squarely reinforced. Recall:

> Remember that architecture is a profession that is more than a service. We have a say, and we have to be responsible for it. We need to be there as projects are being formulated . . . (and use our) position of tremendous influence.[22]

A final example to supplement those drawn from Auroville and the Prabha Devi lecture hall can be drawn from the tours of green building sites that were included on our various study tours. On an RSIEA visit to green architecture sites in Chennai, the first was the India corporate headquarters of Grundfos Pump Manufacturers. The building was India's first-ever LEED-certified gold building; at that time, "gold" was the highest LEED rating yet awarded in India (though this would change almost immediately afterward).

At our first stop after several hours of driving, the group streamed out of the bus and filed through the building's front entryway. Some paused, taking note of the prominent plaque directly to the right of the entrance. This was the marker that certified the building's gold LEED certification. At its center was a cluster of leaves, and written in large print around this image were the words, "U.S. Green Building Council" and "LEED," along with the certification designation—in this case, the gold medal.

A lingering student soon turned to me and, in an ironic tone, made explicit the obvious question that I imagined we pondered collectively. "Why does the *US* Green Building Council determine what is sustainable in Chennai?" Why should appropriate parameters for defining sustainability *here* come from *there?* "It's not ecological," the student said; "the climate and the materials—and really everything—these are different from construction in the U.S. A gold building there is not sustainable here."

Grundfos Headquarters itself, which for our purposes was a study site, was simultaneously a material link to transnational circuits of sustainability definition and assessment, *and* a staging area for formulating and articulating claims about, and the stakes of, precisely what good design is and how it is enacted. As we walked its corridors and observed its features, the building was itself a kind of provocation to define good design in place and time, an invitation to assess the sustainability achievement signaled by gold certification.

As the formal tour unfolded, aspects of the meaning of, and work performed by, gold certification revealed a particularly corporate inflection that up to that point we hadn't engaged in classroom lectures. Just beyond the doorway, a greeter addressed our group in a large, light- and plant-filled foyer. One wall listed the Grundfos official code of conduct; alongside it was a comprehensive list of the building's green technical features. Together, they professed deep commitment to a version of sustainability that embraced a specific kind of eco-capitalist morality, one that echoed many of the standard principles of so-called green capitalism.

The tour itself was a highly stylized and technology-savvy presentation. In addition to its environmentally sound design features, our guide told us, the building also made a positive "social contribution." Laborers here did their jobs in the most light-filled and fulfilling of spatial settings, which in turn produced, he claimed, "much happier, more productive workers." Here, "social" good was assessed directly as increased production, and quite clearly, higher profit for the company.

Our visit eventually led to the office of the regional CEO for Grundfos, who elaborated more fully the specific transnational corporate culture within which the "message" of the building was nested. The Indian Regional CEO of this Danish company spoke from an office desk decorated with miniature Indian and Danish flags; behind him an enormous Danish flag draped across an entire wall.

The CEO opened his remarks by assuring us that Grundfos is "very profit oriented." But, he continued, "the important question is *how* we generate that profit. We don't want to be number one; we want people to know us by our commitment to the environment."[23] The company's mode of conveying that commitment involved the global vocabulary of sustainability, namely USGBC LEED certification. The LEED gold building stood for the presence of certain types and numbers of technical features, but also for its place in an international corporate geography of a specific kind of capitalist commitment.

The students were especially interested in the design features that had "earned" this building its LEED gold status. Each time the tour guide identified something, small groups seemed to join around the feature and discuss it. The tension between our guide's narrative emphasis on "scoring points" and the students' general desire to understand why certain design approaches were chosen over others eventually produced an almost palpable unease, exacerbated when the guide explained that most of the strategies employed to maximize LEED certification points were those that were easiest to undertake. At every instance, the design team avoided approaches or materials that would alter the cost, challenge conventional materials mixes, or dramatically modify standard construction and design practices. Grundfos had simply gathered all of the proverbial low hanging fruit, and the result was the visibility enabled by LEED gold status. After all, we too were there at the headquarters.

As we completed the tour, our guide moved swiftly between pride in a kind of moral achievement and pride in "getting the gold" without exerting much effort.

In blatant contrast to the modality of good design emphasized in the RSIEA classroom, the stewards of this building seemed to mark environmental architecture attributes only when they turned on questions of profit: energy efficiency saved the company money, for instance, and worker productivity boosted profits. This sort of "green" building was a rather transparent, strategic capitalist strategy rather than an example of good design. Several students later labeled the tour, with disgust, as "greenwashing."

At the lunch break, Professor Rajeev Taschete and a group of students talked through the part of the tour we had just completed. A spirited conversation heard students listing item after objectionable, and often absurd, item. "This is just a checklist," one student said; "it's not good design at all. It fails in all the ways that matter! If this is the example, LEED gold means nothing for India."[24]

The tour of India's first LEED gold building was not, then, a study of how to follow in this champion's footsteps. On the contrary, it unfolded as a systematic critical exercise in which nearly every built form aspect that earned LEED points was debunked as somehow contrary to good design. In practice, then, neither the "follow the protocol" approach, nor the outside metric, lived up to the standards of good design.

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Emboldened with the hybrid knowledge form derived from classroom lectures, and the confidence in their agentive potential reinforced across the curriculum, students who reached the last part of the RSIEA program enrolled in a capstone-style course called Environmental Architecture Studio (also called Design Studio). Offered in three consecutive parts, the three courses assembled under the rubric combined classroom time with a design project assignment undertaken in student teams. Part lecture, but mostly field-based, this course gave students their sole opportunity to practice good design under the guidance of RSIEA faculty.

Design Studio courses posed a design challenge that came from an actual client, and the proposals that student teams created were presented to that client at the end of the three course sequence. In 2012, the brief involved designing a set of villas for an art resort development at Pali, about 40 km from Popoli, and a nearly two hour drive from Mumbai. The students were directed to design twelve residential villas over 6.5 acres of land that we were told was "undeveloped." An agent for the developer visited the classroom as our course got underway to convey the resort owner's vision.

Introducing herself as Shilpa, the middle-aged, fashionably dressed agent described the developer as "young, adventurous, and (wanting) to change the typical attitude." He envisioned a resort that would provide an "escape to nature," she told us; he believed that "when someone comes from the city and gets a natural experience, it changes the state of mind." To further frame the context, she asked students to imagine a setting in which the surrounding villages grow rice,

mango trees populate the hills, and "you feel nature." The terrain was rich with boulders, red soil, basalt, and "lots of trees." On a separate, but adjacent, lot, other land owners would eventually construct forty private homes, making the site a "nature escape" that was quickly transforming, becoming more and more a visibly connected node in an urban-rural continuum.

The resort was to be called Serenity Villas; in their Design Studio assignment, the students would divide into teams, each developing a plan for twelve cottages of three to five hundred square feet. A swimming pool, bar, and restaurant were also planned for the resort complex; an amphitheater would be built at its center.

Little was said, or asked, about the people who were already living in the villages surrounding the assignment site, or the land use and land tenure conditions that preceded the making of the Serenity Villas plot. Shilpa emphasized the cityfolk who would journey from Mumbai to patronize the resort instead, describing them as "people in fancy cars who want to experience nature," and "people who are thirsty for nature but they don't know how to enjoy it." As her project description concluded, we learned that the following week's class meeting would take place on the site in Pali. We should plan to walk the land and conduct our first site assessments. This was it: our newly gleaned, hybrid knowledge form would be put to experiential test. The room was giddy with excited chatter as Shilpa bade us farewell.

The faculty coordinator for the Design Studio that semester, Professor Priti Bhandari, had herself trained at RSIEA years earlier. She had gone on to practice environmental architecture in Mumbai with some amount of success. Once Shilpa had departed, Bhandari turned to us with a kind of urgent sincerity. This project brief, she said, would be the culmination of everything we had done at RSIEA. Short of our independent thesis projects, the Design Studio project was "the most important work" we would undertake. If the developer was convinced by our designs, he was likely to actually *build* one of them, so of course we needed to "take this very seriously." Then, as if to underline that good design implied far more than protocols, templates, or metrics, she said, "and remember that this whole semester is about values. You're questioning what is right. You're moving way beyond architecture."[25]

Our next course meeting found us assembled at the site in Pali. The instructor divided us into teams, each charged with a set of data collection tasks that the class could aggregate into a full social and ecological contextual picture of the site. This would be our first experiential attempt to derive the "integrated knowledge" that we would need to undertake good design. A sense of the breadth of biophysical and social data we expected to consider by this advanced point in our training can be gleaned from the assignments delivered to students in that first field visit. Working independently in their respective teams, each was charged with preparing a presentation for the other students on one element of the comprehensive site assessment below. Expectations for the depth and sophistication with which we

FIGURE 5. RSIEA Design Studio students explore the Pali project site. *Photo by the author.*

would complete each list were minimal; what mattered was assuming its attendant, expansive view—viewing the site of our design brief in a fully integrated way.

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The RSIEA curriculum reflected its primary objective: to impart to architects the capacity to understand the environment as an integrated subject. From the opening day lectures through the design studio experience, we learned that environmental architecture in the form of good design could never be reduced to the mastery of prefabricated tools or metrics; it depended instead on developing proper values and an agentive stance not only to conceptualize a practice that could transcend existing structural limits like costs or codes, but to actually do the same in practice. Good design depended on a hybrid knowledge form that was both globally sanctioned and anchored to being "Indian." It assumed few limits to architects' agentive potential.

Through RSIEA training, an active and shared notion of architecture's environmental object was constructed, defined, and translated into a modality of responsible practice. We found that environment, in its fullest sense, in places far flung from Mumbai: from the Pali study site to the tours I will discuss more fully in chapters to follow, environmental concepts gleaned in the classroom were reinforced quite afield from the dense human presence and built development of the city itself.

The vast terrain of political economic and power differences that the good design practitioner would traverse, and the extent to which the architect's work—even as an environmental architect—might reinforce or exacerbate its inevitable forms

PALI Site Visit Assignment

	ASSIGNED TASK AT THE SITE	EXPECTED OUTCOME OF ASSIGNED TASK
Group A: Site, History, Climate, & Air Environment	Site map; historic events; disaster proneness; climate analysis: net and field measurement; air quality and noise parameters measured or net searched; micro-climatic and/or diurnal variations, if any. (All these as researched or collected from site to be incorporated into the sheet as drawing or a summarized/tabulated format.)	**SHEET 1:** Formatted on A1 size: Maps-regional, contextual key plan and site plan as drawing; history; climatic charts with the analysis mentioned therein; polluting activities and their anticipated impact on air environment.
Group B: Land, Topography, & Built Forms	Land holdings; population occupying the land/using its resources/ maintaining for resource; seasonal variation in land-usage, e.g., weekly bazaar/festival. (All these as researched or collected from site to be incorporated into the sheet as drawing or a summarized/tabulated format.)	**SHEET 2A:** Formatted on A1 size: Land-use map categorized for tenure, contour plan, site sections, sketches & photos of indigenous & contemporary construction and recordings of current developmental features.
Group C: Hydrology	Water sources & resource-to- agriculture/people/etc.; sewage and storm water drainage/indigenous methods/etc.; Problems, say water-logging/ seasonal scarcity of water/etc.	**SHEET 2B:** Formatted on A1 size: of the watershed, catchment area, & river basins of the region; hydrology of site (village); water sources; usages; etc.
Group D: Soil, Geology	Collection of soil samples from identified key locations, natural features dependent on the geology; detritus (soil organisms); importance of the natural features to the natives; (All these as researched or collected from site to be incorporated into the sheet as drawing or a summarized/tabulated format.)	**SHEET 3:** Formatted on A1 size: Soil analysis maps, sketches or photos of soil erosion control measures implemented at site.
Group E: Flora & Fauna; People & policies	Document plant associations observed or researched; decline in any species observed in last decade; list of number & types of trees, shrubs, plants, undercover, characteristics & habitat (location). List of fauna sighted/heard/ net search characteristics & habitat. Observed flora-fauna associations	**SHEET 4:** Formatted on A1 size sheets: Vegetation plan, regional and site plan **(village plan digitized from Google)** with trees; data tabulated–biodiversity in photos & pictures, food resource, analysis of the produce, season, and land usage.
	NGOs operating in the region and their focus activities; tribal & inhabitants-culture, livelihood, etc.; tribal and land policies-development rules of the region; changing trends in livelihood.	**SHEET 5:** Formatted on A1 size sheets: Photos & pictures; organizational diagrams in terms of how the NGOs work; notes with references; site observations on activities and usage of resources, space, etc.

Students are expected to:
Make a checklist of parameters to measure and observe at site.
Make checklist of things to carry for site visit for their specific topic.
Make sample questionnaire for any field data required from local inhabitants and/or clients.
Refer to books in the library to develop the format for data documentation for the specific topic.

of social exclusion and violence, were not the direct focus of this curriculum or its attendant praxis. Still, as was suggested in students' strong reaction against the "greenwashing" version of green design we encountered at Grundfos, these issues were inescapable. Much of the time, however, learning good design meant equating proper practice with the almost automatic byproduct of a simultaneously sustainable city and more harmonious society. The precise contours of the bridge between sustainable city and sustainable society seemed both presumed and, at least in overt curricular terms, omitted, but the responsibility to forge that bridge rested unquestionably with the architect properly equipped to practice good design.