

URBAN UNEP PROPOSAL

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UNITED NATIONS ENVIRONMENT PROGRAMME

PROJECT DOCUMENT

SECTION 1

PROJECT IDENTIFICATION

1.01 Programme Activity

1.02 Title of Project

Resource-conserving and resilient urban design

1.03 Project Number

1.04 Cooperating Agency

International Institute for Applied Systems  
Analysis, Laxenburg, Austria

1.05 Duration of the Project

Commencement: 1 June 1975  
Completion (this phase): 31 January 1976

1.06 Cost of the Project

Total cost of the project:	\$80,000
Cost to The Fund of UNEP:	40,000
(Balance of \$40,000 to be contributed by IIASA)	

2.01 Relationship of Project to UNEP Objectives and Priorities

This project is related to a number of UNEP objectives and priorities, *inter alia*:

1 (I) I 1 (6):

To encourage and support an integrated approach to the planning and management of development, including that of natural resources, so as to take account of environmental consequences, to achieve maximum social, economic and environmental benefits.

1 (I) III 12 (d) (vi):

To assist countries, as appropriate, in the formulation of guidelines for project appraisal which take into account the environmental aspects.

8 (II) I 3 (d):

Guidelines should be elaborated for the integration of the environmental dimension of future development projects, on the basis, *inter alia*, of the assessment of ongoing or completed projects with the aim of ensuring that the inclusion of environmental parameters does not adversely affect development priorities.

2.02 Objectives of the Project

The general objectives of this project, and of the succeeding stages for which it forms a logical first step, are to expand the criteria governing the design (in the largest sense) of urban regions, adding explicit concerns for *resource conservation* and *resilience*. Typically overlooked, these criteria aim respectively at ameliorating the impact of urban development on the environment through more efficient and interlinked use of scarce energy and material resources in urban regions, and at minimizing the net costs to the concerned society of the inevitable system or subsystem failures.

Oriented toward realistic implementation, the project aims to translate these criteria into practical guidelines, policies, and techniques which may be applied by governments. Ultimately they should be integrated into urban design through:

- o *a priori* methods for shaping planned developments,
- o mechanisms to influence informally planned or essentially unplanned human settlements,
- o uniform assessment procedures for governmental evaluation of development plans, and perhaps
- o approaches to modifying stocks and flows of scarce resources in urban regions.

For this first-stage work, the specific short-term objective is the development of a coherent research strategy on resource-conserving and resilient urban design to be pursued in depth during 1976-77.

3.01 Summarized Description of the Project

Urban design entails intricate calculations and value judgments about the social, physical, and economic infrastructures most suitable for particular urban regions, and about the interaction among regions. Traditional criteria used in the assessment of urban development proposals are overwhelmingly economic, in the limited, "micro" sense of that word, and such quantitative methods as are in use reflect the poverty of the objectives toward which they are oriented. These calculations and assessments are of course most important, and most difficult, for large new urban developments (e.g., new cities, intensive development or reconstruction of lightly developed regions, major additions to existing cities) where the leverage of deliberate policy -- and the opportunities for irreversible mistakes -- are the greatest.

This project will work to develop to implementable form two criteria that are vital for new developments but are usually overlooked: *resource conservation*, entailing a minimal net of undesirable impacts on regional and extra-regional environments; and *resilience*, a high degree of regional adaptability allowing damage limitation and quick recovery from the inevitable system and subsystem failures (e.g., storms, utility failures, fires, critical materials shortages).

Though the detailed agenda must await completion of this first, detailed planning stage, we presently envision initially pursuing three approaches to provide a solid base for the project's evolution:

- (a) A comparative multi-national study of the gross material and energy ecology of large urban regions, building on two parallel research thrusts at IIASA:
  - o an independently supported project on the comparative performance of urban regions, in which a uniform series of urban economic models will be confronted with a consistent set of data from a number of countries, East and West, and all three Worlds; and
  - o a critical scrutiny of regional energy policies, comparing three sites in depth with the active participation of concerned local officials and policy researchers.
- (b) Concrete development of the concept of resilience for urban affairs, treating it as both:
  - o an overarching metaphor for the flexibility, adaptability, and human survivability that needs to be designed into urban development at all scales, especially in those now less-developed countries where urban growth is inevitably going to be most overwhelming in coming decades, and where fragile environments combine with resource scarcity to require

the focussing of world concern; and

- o a specific, fundamental design principle at the scale of physical planning, architectural design, and engineering. At this scale, resilient design implies acknowledging that failure of systems elements and relations is inevitable, analyzing the potential modes and implications of these failures, and minimizing their long-run net costs. A few design techniques, such as "weakly linked diversity" or "redundancy analysis" may be borrowed, with appropriate modifications, from ecology and engineering; other will need to be developed from a distillation of experience, pragmatic insight, and analysis.

- (c) Following sequentially on the above, the development of practical criteria for the uniform assessment and evaluation of urban design and development proposals. These could take the form, for instance, of model sections for addition to building codes, suggested comprehensive guidelines for planners' technical assessments, and various advanced training materials.

The whole area is still so new that the point of entry into the work must entail a detailed survey and planning stage, to ensure relevance of later research and dissemination stages. A critically important element in this proposed planning stage is the close cooperation of UNEP officials, whose guidance on the content of future stages and on the nature of the output formats is essential. Accordingly, during this first planning phase, for which we seek matching UNEP funding, we plan to:

- (a) invite several leading people with different perspectives on the field of urban design to work intensively at IIASA for periods of one to two months, preparing "proto-proposals" and describing in detail concrete research directions that appear fruitful to them. With these as focal points for serious discussion, we will then
- (b) convene a select workshop involving approximately eight leading authorities in pertinent areas. One or two should be UNEP people, and the others should be jointly selected by IIASA and UNEP. The output of the workshop is intended to be a detailed and fairly long-term research plan to be pursued by IIASA and cooperating institutions in 1976 and beyond. Among the topics to be addressed by the workshop are the precise nature and scheduling of specific research activities and the identification of appropriate methodologies, scientific personnel, policy-making 'clients' and output formats for the work.

### 3.02 Background Data

Much literature exists purporting to show that cities and urbanized regions are bad environmentally--that they have adverse effects on the people who live there and on their broader surroundings. Clearly cities do discharge larger amounts and often high concentrations of effluents than do less dense regions; they alter the climate around them, sometimes subtly; and they are felt to consume excessively large amounts of material and energy resources. Yet the world's urban regions continue to grow, and people everywhere show marked tendencies to continue to cluster--especially in the less-developed countries, where rural-to-urban migration and net population growth are expected to remain high to the end of this century.

Even if population growth, as such, were to slow dramatically, as much new urban fabric would need to be added over the next thirty years as exists today. The criteria by which this fabric is designed--explicitly or implicitly--will largely determine its form and its impact on the human and physical environment.

Work in ecology, environmental protection, and more recently in energy, has begun to accumulate evidence about the environmental effects of different urban regions. Work has just started to unravel and sort out this evidence to discern and assess the implications for urban design; as yet few substantive results are available. The field is still in its infancy. Work to examine the resource implications of alternative urban design, even to the rudimentary extent developed for agricultural regions, has barely begun at all.

In addition, it has become painfully clear in recent years the degree to which the complex interdependence of modern urban life can enhance, accentuate, and spread otherwise local failures and disasters. Key subsystem failures--e.g., of electricity, water, fuel or food supplies, transport--have induced concatenations of failures and problems that have nearly paralyzed whole cities. At times, even minor failures in key links have precipitated chains of events that have proved exceedingly costly and vexing. And, at the larger scale, natural disasters such as earthquakes and storms have had particularly lasting and compounded effects when they have affected urban regions--as witness Managua and Darwin.

Sub-system, system and regional resilience is thus a vital criterion for urban design. The good features of cities, of interdependence, must be preserved and enhanced. The potential roads to disaster must be identified beforehand and designed out. Work in ecology

and applied mathematics at IIASA (and to a lesser degree elsewhere) has begun to quantify and make concrete notions of resilience and worthwhile interdependence. This field is still in its infancy, but progressing rapidly. We hope to capitalize on its momentum.

### 3.03 Work Plan and Timetable

- June - October 1975: Invited experts work intensively at IIASA (tentative arrangements made with some; people are ready to work as soon as funding approved) and with IIASA staff, developing proto-proposals for subsequent research, development, and dissemination (RD&D) program.
- September - October 1975: Circulate proto-proposals among IIASA staff, UNEP project officers, and selected outside authorities for comments, criticisms, and amendments. Make final plans for workshop.
- November 1975: Workshop at Laxenburg. Synthesize and distill results.
- November - December 1975: Develop detailed RD&D plan for 1976-77, in cooperation with UNEP project officer.
- January 1976: Formal submission of workshop report and proposed RD&D plan to UNEP. Subject to adequate support, commence building formal ties with collaborating groups for later stages.
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### 3.04 Resources Required

For first-stage work:

- (a) Four invited experts for average of one and one-half months apiece in Laxenburg;
- (b) Four IIASA scientists for an average of two and one-half months each;
- (c) Travel funds for liaison with UNEP in Nairobi and possibly Geneva;
- (d) Travel, accomodation, and administrative support for a week-long workshop at IIASA involving some eight visitors;
- (e) Approximately six man-months of editorial, secretarial, and administrative support; and
- (f) Data processing, printing, and other IIASA technical services as required

### 3.05 Budget

Corresponding with the items in 3.04, we suggest:

	from IIASA	from UNEP	Total
(a) Experts		\$21,000	\$21,000
(b) IIASA staff	\$16,000	13,000	29,000
(c) Travel		6,000	6,000
(d) Workshop	11,000		11,000
(e) Support	6,000		6,000
(f) Technical	7,000		7,000
Total	\$40,000	\$40,000	\$80,000

### 3.06 Counterpart Contribution

Of the \$80,000 budget for the detailed planning stage, half will be paid by IIASA. See 3.05.

## SECTION IV SUPPORT OF PROJECT FROM THE FUND OF UNEP

Support requested from The Fund of UNEP is \$40,000.



## SECTION V

## REPORTS

- 5.01 Draft proto-proposals for UNEP comments in September and October 1975. Workshop summary and detailed RD&D proposal in January 1976.
- 5.02 Within sixty days after completion of the project IIASA will supply UNEP with a statement of account indicating that the resources provided from the Fund have been expended in the manner agreed upon by this project document. Any portion of such resources remaining unspent or uncommitted by IIASA on completion of the project shall be reimbursed to UNEP within one month of the presentation of the financial statement.

## SECTION VI

## FOLLOW-UP ACTION

Execution of the detailed research, development and dissemination plan for resource-conserving and resilient urban design which is the subject of this proposal. Presently planned for 1976-77, this follow-up will certainly require UNEP guidance and probably UNEP cost-sharing. Detailed plan and budget will be formally submitted to UNEP in January 1976.