REGIONAL PLANNING, ENVIRONMENTAL MANAGEMENT, AND MODELING IN THE KINKI REGION OF JAPAN: A CASE STUDY

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Preface

One of the research tasks which the Management and Technology Area at IIASA has addressed is the program management of present day large scale development projects. Previously studied were the Tennessee Valley Authority (TVA) in the USA, the Bratsk-Ilimsk Territorial Production Complex (BI TPC) in the USSR, the North Sea oil development in the UK and Norway and the Super Express Railway Project (Shinkansen) in Japan.

This paper reports the findings of a field study of the Kinki region in Japan carried out within the above series of IIASA case studies on regional development programs. The paper focuses on the elaboration of program goals and strategies, organizational structure, the use of models and computers in planning and management, and the integration of environmental management into overall programs.

Abstract

The purpose of this study is to describe and assess the present policy making on long term regional development plans and environmental management systems in the Kinki area of Japan as a typical example of a highly developed industrialized region with a full range of environmental problems. The study follows an analytical framework developed at IIASA in the course of case studies of large scale development programs.

Three aspects of regional policy making are examined: comprehensive development plans, environmental management, and the role of models and computer applications in regional planning and management. Emphasis was put on attempts to integrate inter-prefectural and national-prefectural planning and decision making. Organizational interlinkages, comprehensive plans, and joint budgets are seen as the main mechanisms for such integration. The study findings indicate that while the national-prefectural integration seems to work well with a clear separation of functions, multiple interrelations of organizations, and a strong centrally controlled budget, the interprefectural integration lags behind. In spite of many common problems in the Kinki area there exists no policy formation body acting from within the region, and joint plans, models, or shared budgets are more an exception than the rule.

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Regional Planning, Environmental Management, and Modelling in the Kinki Region of Japan : A Case Study

1. INTRODUCTION

This report summarizes the findings of a field study of the Kinki region in Japan carried out within a series of IIASA case studies on regional development programs. Three examples of regional development were studied previously: The Tennessee Valley Authority in the USA [1,2], the Bratsk-Ilimsk Territorial Production Complex in the USSR [3,4], and the North Sea petroleum development [5]. The goals of these case studies were twofold:

- to gather experiences in planning and management methods used within the development programs;
- to develop techniques which could be applied to the analysis and design of other development programs.

These case studies consisted typically of a series of conferences at which researchers from IIASA and from the region participated. In addition a team of IIASA researchers conducted a field study in the specific regions. The research on the Kinki region was conducted in close cooperation with the Kinki Integrated Regional Development Modeling Project (IRDMP) carried out by several scientific groups from universities in the Kinki region (Osaka, Kyoto, Kobe) and IBM Japan, headed by Y. Sawaragi from Kyoto University. A workshop was held at IIASA [6] in which members of this project presented their views of the Kinki problem and possible modeling and planning solutions. Another conference was held in Kyoto [7] with presentations both from IIASA scientist and members of the Kinki project. Further study results were reported by Japanese scientists in a conference at IIASA in June 1978 [8]. Meanwhile a small team of IIASA researchers conducted a field study in the Kinki region during which extensive interviews were held with prefectural and city officials on the problems of comprehensive development planning, environmental management, and regional modeling. This report covers the results of this field study.

The study structure is presented in Table 1. Within each of the three focal topics of the study, four main elements of the regional management system were analyzed: organization, plans, policy instruments, and modeling tools. Stress was put on the problem of how to manage regional development, rather than on the specific socio-economic problems of the Kinki region per se. Although the study is largely descriptive, it also attempts to express management problems both in terms of the perceptions of the regional officials and in terms of problems identified by the research team.

The Kinki region as such will not be described here in detail (some basic data is given in the introduction to [8]).

Table 1 STUDY STRUCTURE

MANAGEMENT ASPECT / AREAS	ORGANIZATION ACTORS/VALUES	PLANNING COMPREHENSIVE DEVELOPMENT PLANS/GOALS/ PROJECTS	POLICY INSTRUMENTS BUDGETING/ STANDARDS	MODELLING FORECASTING/ IMPACT ASSESSMENT/
REGIONAL COMPREHENSIVE SOCIO-ECONOMIC DEVELOPMENT	2 X	XX	XX	XX
ENVIRONMENTAL MANAGEMENT	3 X	X	XX	XX
MODEL REPRESENTATIONS	4 X	X	X	

2, 3, 4 represent the numbers of chapters in the report covering corresponding areas.

X
XX Depth of study

Kinki is one of eight Japanese regions which are mainly distinguished as historical units used nowadays for statistical and planning purposes (the latter in the central government agencies). The regional breakdown is, however, by no means rigorous and is not accompanied by any sort of administrative organization such as regional governments. Thus, when speaking about the regional level one has to refer to national spatial and physical planning bodies on the one hand and to subregional-prefectural authorities on the other.

In Figure 1 some examples are given for the (prefectural) problems in the Kinki region. The underlined captions indicate large prefectural (or supra prefectural) projects. An overall problem not mentioned in this Figure is the relative decline of Kinki as the traditional center of Japanese manufacturing, trade and culture, especially if compared to Kanto (the Tokyo metropolitan area region). Table 2 presents some density-type indicators for prefectures within the Kinki region. The first four columns are those prefectures which were visited by the study team. These four prefectures were selected because of their relative importance in the Kinki area.

The methodology used in the description and the analysis of the Kinki regional development case follows to a large extent the methodology elaborated for the North Sea study [5]. The planning and management system and its organization are viewed through the set of actors (institutions, groups of individuals), where actors can be distinguished on the basis of their values and instruments. The set of actors together with organizational interlinkages, values, and instruments constitutes the planning and management system that defines the development path. For specific managerial subproblems like standard setting or model utilization it is necessary to define actor subsets or groupings. The groupings are based upon proximity or similarity of values and instruments, joint problems, or organizational links.

Although the study approach was largely descriptive and problem oriented based on the perceptions of the interviewed prefectural and city officials, the authors also attempted to make their own assessments of the management system in terms of consistency, integrativeness, and comprehensiveness, concepts elaborated in more detail in [5]. Consistency first of all refers to the consistency of the goals of the various actors in the region, secondly to the consistency of the policies by which these actors attempt to achieve their goals. Its analysis simply shows whether, for example, one prefecture tries to achieve goals that are in conflict with another one, or if they use policies and instruments that may contradict each other. The analysis of the integration of actors, goals, policies attempts to identify existing or potential interlinkages between prefectures (horizontal integration), or between national government, prefectures, and local government (vertical integration). In particular, the study looked at organizational integration, and integrative planning. Somewhat less attention

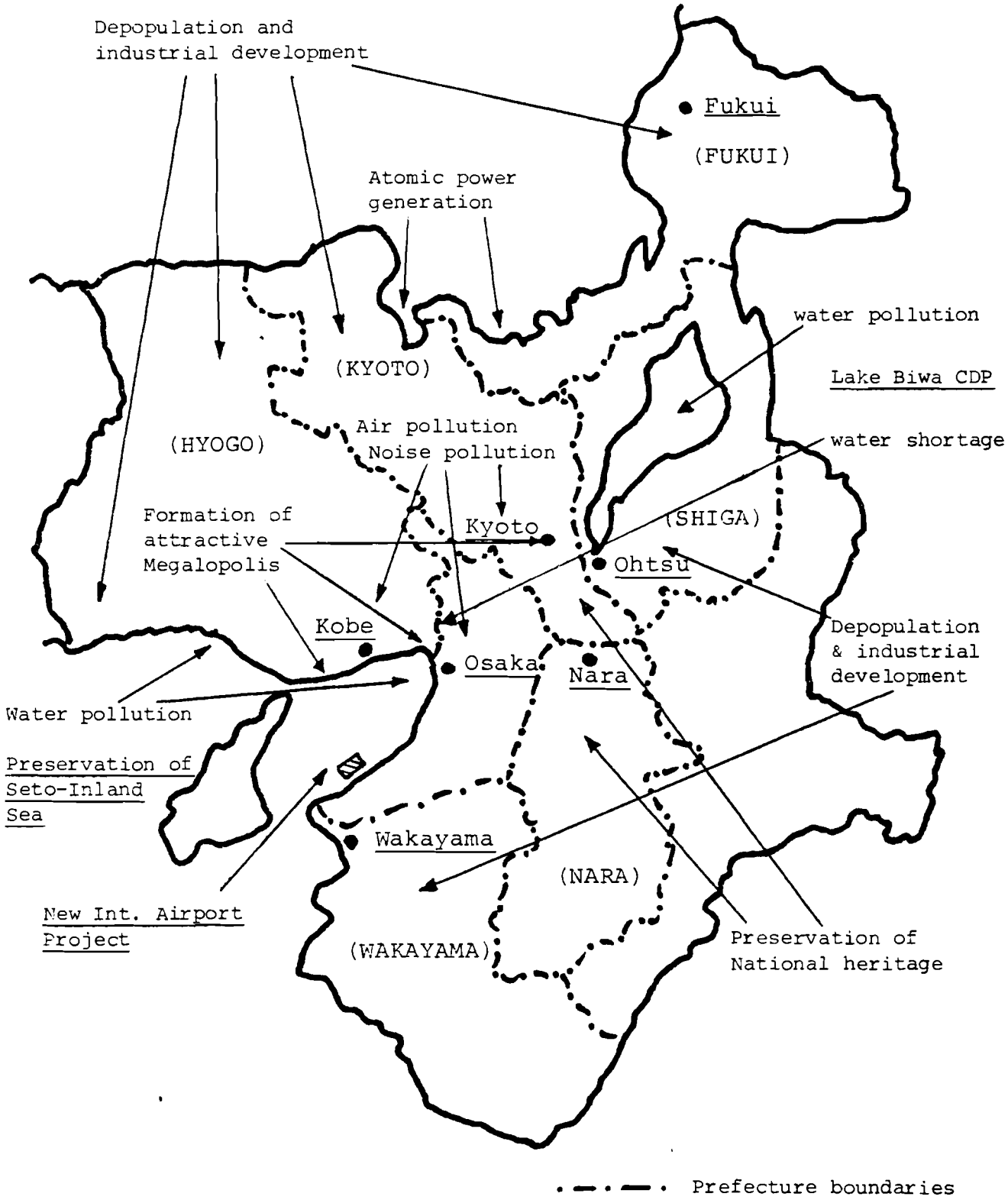

Figure 1 PROBLEMS IN THE KINKI REGION

Table 2 SELECTED SOCIO-ECONOMIC INDICATORS (per km^2) FOR PREFECTURES IN THE KINKI REGION

	OSAKA	HYOGO	KYOTO	SHIGA	NARA	WAKAYAMA	FUKUI
• Population density ($No./km^2$) 1975	4,461	597	525	245	292	227	185
• Industrial Outputs (10^6 yen/km^2) 1975	7,074	918	519	390	212	352	169
• Roads (m/km^2) National and prefecture roads 1975	1,022	621	659	545	523	573	506
• Number of automobiles ($No./km^2$) 1976	973.6	134.2	127.3	71.2	66.6	65.2	57.3
• Number of college students ($No./km^2$) 1975	98.0	7.9	25.3	0.6	2.5	0.8	1.1
• Number of medical doctors ($No./10^5$ people) 1974	136	124	173	92	118	120	100
• Availability of sewage system (%)	51.3	37.5	32.8	3.9	11.0	1.7	15.8
• Income (GRP) per capita ($x10^3$ yen)	1,386	1,154	1,134	1,005	927	939	946

will be devoted in this study to the assessment of comprehensiveness - the capacity of the management system to include all necessary elements and aspects of development.

The whole interview process lasted for about two weeks. The following organizations were interviewed:

- Prefectural Governments:

  Shiga, Kyoto, Osaka, Hyogo

  Planning and Coordination Division
  Life and Environment Division
  Public Health Division
  Monitoring Center

- Kyoto City Office (Public Health Division)

- Experts:

  Kyoto University and Osaka University
  Institute for Environmental Research
  on Kansai Airport

- National Land Agency

- Kinki Bureau of Ministry of Construction.

At the end of this introductory section it should be remarked that the study team does not propose any "alternative policy" or set of models as methods of solving problems in the Kinki region. Observations are made throughout the report and are then summarized in the final section. They are meant to point out areas where there is a need for an effort to ensure more consistency and integration within overall policies and decisions. This report does not address the subsequent question of establishing a balance between integration and regional/ prefectural autonomy.

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2. REGIONAL COMPREHENSIVE DEVELOPMENT PLANS (CDP) OF THE KINKI REGION IN THE 1970s

2.1 Background of Regional CDPs in the Late 70s

Since the oil crisis in 1974, Japan, as many industrialized countries, has been forced to cope with the challenge of a shift from high growth rates to low growth rates and from a quantitative increase in income to a qualitative enrichment of life, both in the face of a shortage of natural resources and the burden of heavy environmental pollution. In addition, each individual prefecture (an autonomous regional administrative unit) in the Kinki region has been confronted with severe constraints which were not experienced before the oil crisis, e.g.,

- shortage of water, energy and food supplies;
- limitations of the environmental carrying capacity;
- financial crisis at the regional level;
- change in the age structure of the population from a pyramid type to a cylindrical type.

These problems did not suddenly emerge, but were concealed during the period of rapid economic growth. Due to a large annual increase in regional revenue and a subsidy from the central government, local governments could rather easily respond to the various requirements stemming from different environmental, political and economic sources. However, the position has now changed and the prefectures receive a smaller share of the economic pie and, together with lower growth rates, are now compelled to cope with the following major problems:

- How to allocate total revenue in a welfare system and improve the environment while at the same time promoting a change in industry from a heavy, chemical base to an information-oriented base;
- How to establish a financial planning capacity from a prefectural rather than a national viewpoint;
- How to coordinate and integrate their own regional development plans into the large-scale national programs and projects;
- How to respond quickly to local community and resident movements and to improve public participation in the planning process.

These issues necessitated Prefectural Comprehensive Development Program (PCDP) for each of the prefectures in order to coordinate individual projects not only at the prefectural level but also

at the inter-prefectural level and to integrate projects into the national programs. PCDP provides an instrument for arriving at a consensus among the various parties, communities and residents who have taken part in the planning process. According to a recent survey carried out by the Ministry of Home Affairs [1], almost all the prefectures in Japan have completed or are developing their CDPs for the period 1975-77 (44 out of a total of 46 prefectures). In particular, the leading prefectures of the Kinki area set an example by introducing new methodologies such as systems analysis or computer assisted planning into the planning process of the PCDPs. In this section, the Kinki regional development will be discussed under the following three aspects:

- the legislative and organizational framework;
- the content and planning process of PCDPs;
- policy instruments for the implementation of PCDPs.

Thus, following the structured policy analysis developed in previous papers [2,3,4] and information gathered during the field study [5-17], prefectural CDPs will be analyzed in terms of management aspects such as actors/values, plans/goals, and budgeting/standards with emphasis on interactions between prefectural and national planning.

2.2 The Legislative and Organizational Framework in Kinki Regional Development

Table 3 illustrates the legal and organizational chronology of the regional development associated with the Kinki area. The Comprehensive Land Development Act set up in 1950 provides a basic legislative framework for both national and prefectural development planning. It should be noted, however, that up until 1970 the legal and institutional setting for regional development progressively evolved towards a nation-wide comprehensive system of regional planning linked with national policy objectives (such as restoration of land after the war and doubling of income). The prefecture governments had little capability to elaborate their own development objectives and programs until the late 1960s.

At that time, prefecture governments were mainly concerned about how they could make best use of central governmental financial support for their individual projects and to what extent their projects were involved in the national long-term programs. It was not until about 1965 that prefectures, for example Osaka, began to authorize their own long-term regional plan [5]. The main organizational tool in the central government was the Kinki Redevelopment Agency which was later reorganized into one of the departments of the National Land Agency (NLA) when it was created in 1974. The agency, which is

under the prime minister's office, was the main actor which tried to coordinate each prefecture's project into the national framework which could then have been part of the National Comprehensive Development Plan (NCDP). This organization issued the Basic Development Plan (BDP) for the Kinki region in 1965 whose objectives were [6]:

- to propose a way for the Kinki area to attain the economic structure demanded by the expected growth rate which the National CDP aimed at - within the target period of 1965-80;

- to redevelop densely populated areas to avoid disruption of the urban environment by rapid growth in population;

- to develop sparsely populated areas to fill the gap in community services between high-density and low-density areas;

- to coordinate both the development of industry and social welfare services, thus helping the Kinki area to attain a desirable rate of growth.

The NLA used several policy instruments such as zoning areas into three categories (suburban development zone, urban development zone, and environmental preservation zone) and providing special financial measures for projects such as the development and reinforcement of the transportation system, the river system, housing, and distribution of goods. Yet the NLA did not seem to have achieved their main objectives, partly because of the unexpected rate of expansion in the regional imbalance in the 1960s.

Several ministries such as the Ministry of International Trade and Industry (MITI), Ministry of Finance (MOF), Ministry of Transportation (MOT), and the Ministry of Construction (MOC), are also important actors in the integration and coordination of prefectural projects into the national programs. Each Ministry has a responsibility for long-term consolidation programs such as roads, sewage, flood control, industrial base and ports. Although they have regional offices in the Kinki area in order to be in contact with the counterparts of each ministry in prefectural governments, most of the power for decision making is centered in Tokyo. Apart from the local governments, other important actors are industry and business circles plus various community pressure groups. In terms of direct involvement in the planning and decision process of PCDP, those actors have a limited role, i.e., that of sending their representatives to the advisory council for PCDP which is attached to the prefectural governor's council for PCDP. However, they do have intricate, informal connections with central and local governments. Table 4 shows an attempt to summarize the potential actors, values and policy instruments involved in the PCDP planning process.

Table 3 LEGAL AND ORGANIZATIONAL TRENDS IN REGIONAL DEVELOPMENT IN THE KINKI AREA

	STATUTORY SYSTEM	NATIONAL Plans, Organization	KINKI Plans, Organization	PREFECTURE plans (examples)	MAIN GOALS
1950	Comprehensive Land Development Act (National, Prefecture & special regions)				Restoration of Land
1956	Metropolitan Regional Development Act	Doubling Income Plan (1961-71)			Economic Growth Doubling of Income
1962		1st National CDP (1960-70)		1st Osaka Regional Plan	
1963	Kinki Region Development Act		Kinki Redevelopment Agency		
1965		Medium-term Economic Plan (1964-68)	Kinki Basic Development Plan (Kinki BDP) (1965-80)		Balanced Economic Plan
1967	Basic Law for Env.Pollution; Urban Planning Act			1st Hyogo Regional Plan Osaka Regional Plan	
1969		2nd National CDP (1969-85)			
1970		New Economic & Social Dev. Plan (1970-75) Environment Agency set up	Revision Kinki BDP (1970-80) Lake Biwa CDP Act		Protection of the environment
1972		Revision started of 2nd CDP	Env. Preservation Act for Seto Inland Sea	Planning of Osaka and Hyogo New CDPs started	
1974	National Land Use Act	National Land Agency set up	Start of EIA for Kinki New International Airport Plan	1st Draft of Osaka CDP	Social welfare
1976		National Land Use Plan Economic Plan for 2nd half of 1970s (1976-80)		Hyogo CDP (1976-85) Osaka city CDP	
1977		3rd National CDP	Revision of Kinki BDP (underway)	Osaka CDP (1977-90)	Improve the quality of life

Table 4 ACTOR, VALUE AND INSTRUMENTS ASSOCIATED WITH REGIONAL CDPs IN KINKI AREA

ACTORS	VALUES	INSTRUMENTS
CENTRAL GOVERNMENT • Kinki Redevelopment Agency (National Land Agency) • Ministries of Construction International Trade & Industry Transportation Agriculture & Forestry	• Integration to National Goals • Rectifying Imbalance Within Kinki Area and between Regions • Stable Growth	• Zoning and Siting Guideline • Special Financial Measure • Major Physical Projects (roads, railway, dams, industrial base, etc.) • Public Investment (budget allocation)
LOCAL GOVERNMENTS • Prefecture • Big Cities • Municipalities	• Well-Balanced Stable socio-economic Structure • Strengthening of Regional Autonomy • Quality of Living Environment	• Zoning and Siting Guideline • Local Taxation • Introduction of Specific Financial Aid • Integration into National Project
INDUSTRY AND BUSINESS • Big Business • Local Business	• Growth, Profit • Stability	• Investment • Special Measure (tax cut, etc.)
COMMUNITIES (Residents) • Citizen Association • Anti-pollution Residents Groups	• Civil Minimum for Infrastructure • Environmental Right for Living	• Petition, Lobbying • Complaints, Court Cases

Most of the officials in the prefectural planning division whom we interviewed expressed their preference for independence and individuality of their CDPs, although they did take the national CDP into consideration in forming the general planning framework of the prefectural CDPs. In fact, the prefectural CDP does not legally have to be subordinated or integrated into the national one. In addition, political attitudes of governors* towards the central government plus the fact that historically there was always some rivalry, e.g., Kyoto or Osaka versus Tokyo, increased the difference in the general attitudes at the prefectural level. These facts also show the relatively independent approach to regional development plus an inclination towards residents' requirements, rather than to national goals which have been set up by the central government as far as the CDPs are concerned.

Looking at the interface of core actors between prefectural and central governments, we find two kinds of interactions: one is through the national CDP and the other is through the ministerial long-term plans for public facilities such as roads, ports, sewage, etc., as illustrated in Figure 2. The major policy instruments used to implement the regional development objectives from the national viewpoint are:

- planning guidelines within the central government connecting the national CDP and their long-term projects;
- public investment allocation through ministerial long-term projects;
- special financial measures to stimulate the specific regional objectives.

As indicated by each method underlined in Figure 2, these instruments seem to work efficiently as long as the national and prefectures objectives are consistent with each other.

2.3 The Contents of the Prefectural Comprehensive Development Programs

Turning now to the content of the PCDPs, Table 5 presents a summary of Osaka, Hyogo, Kyoto and Shiga prefectural CDPs including the main area of concern (issue), goals (values) and instruments (policy) [11-15]. In addition, major projects, planning actors and the planning periods are given in the Table.

Looking at the example of the Osaka prefecture CDP, this long-term plan aims to show not only the goals which Osaka should attain in the future, but also policy instruments for facilitating

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*At that time (October 1977) the governors of Osaka, Kyoto and Shiga prefectures were elected by the supporters of the non-ruling parties such as the Japan Socialist Party, Comei Party, Japan Social Democrat Party and Japan Communist Party.

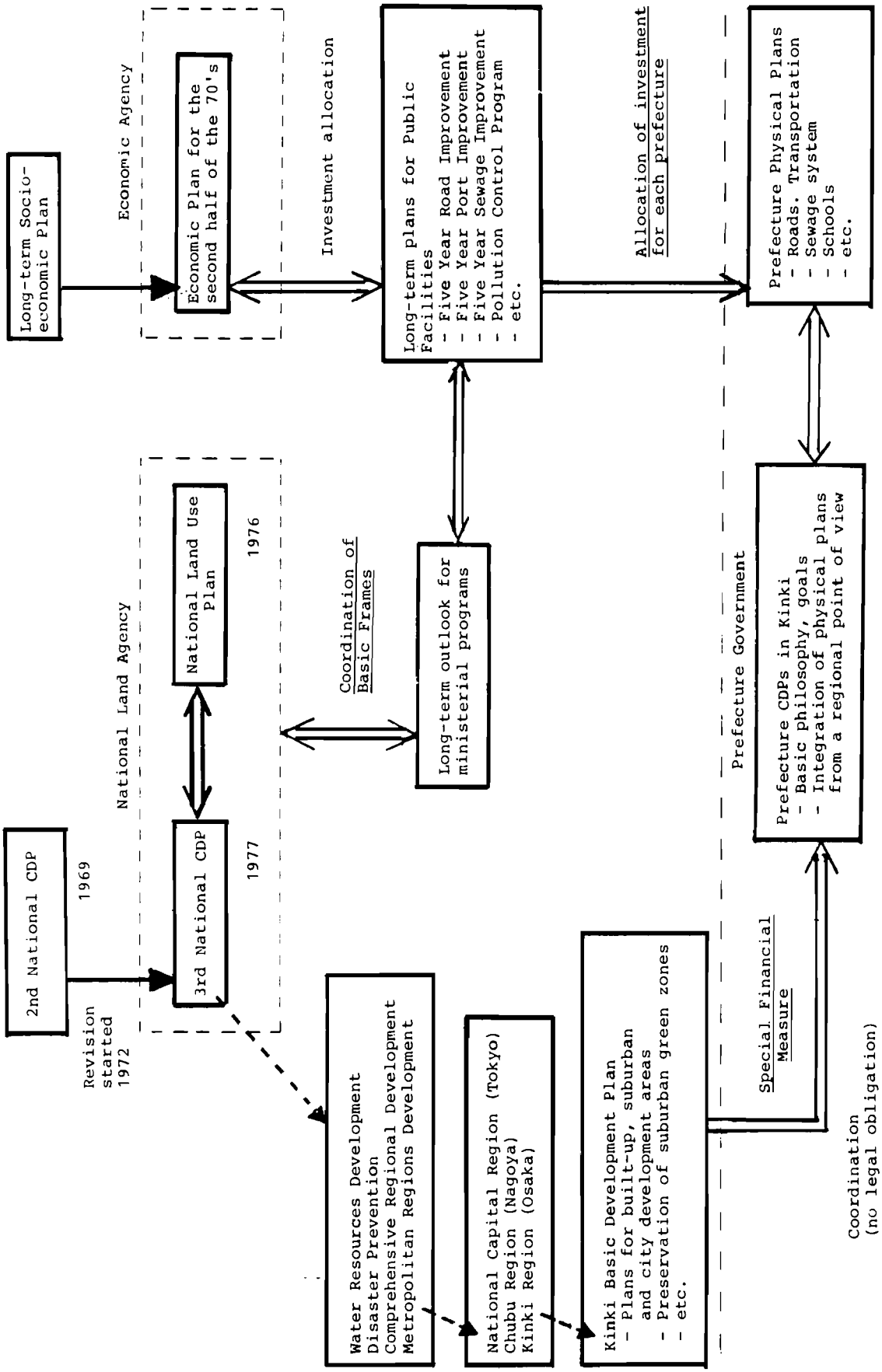

Figure 2 INTERACTIONS OF NATIONAL AND PREFECTURAL CDPs AND POLICY INSTRUMENT

Table 5 PROBLEMS, GOALS (VALUES), INSTRUMENTS AND MAJOR PROBLEMS OF PCDP

PREFECTURE	AREA OF CONCERN	GOALS	INSTRUMENTS	MAJOR PROJECTS	PLANNING INSTITUTION	TIMING (1) Planning (2) Period
OSAKA ①	• Human & welfare society	Formation of welfare system based on human community networks	Local self-taxation system to intensify regional finance		• Governor	(1) 1972-77
	• Environment & overcrowding	Creation of healthy, safe & pollution-free environment	Tightening of land use guideline		• Advisory Council for CDP	(2) 1978-90
	• Reformation of industry-oriented society	Development of culture & information functions on the basis of traditional culture & history	Environmental management system - total emission control -	• BIG Plan (env. management program) • Sewage consolidation program	• Public hearing by residents' monitors	
	• Increase of of local self-government capacity	The formation of an attractive megalopolis zone as a center to western Japan	Comprehensive assessment procedure for development plans	• New international airport		
HYOGO ②	• Human & cultural society	Cultivation of people's attitudes about culture & the quality of life	Educational & cultural facility network		• Governor	(1) 1973-75
	• Social & living infrastructure - depopulation & overcrowding -	Social welfare system as civil minimum	Setting stationed living zone based on social indicators	• New town construction plan for relocating housing & industry	• Advisory Council for CDP • Public assembly	(2) 1976-85
	• Environment & pollution	Conservation of natural environment & creation of a new amenity	Environmental management system - total emission control -	• Total emission control plan (SO_2, NO_x & COD)		
	• Innovation of industrial structure & creation of new regional values	Well-balanced industrial structure from a regional viewpoint	Regional standards for industrial structure & policy issues	• Consolidation of new trunk transportation system		
KYOTO ③	• Difference in income between southern & northern parts	Increase of social overhead capital in order to provide a better environment for living in	Health care, welfare & sewage systems	• Consolidation plan of sewage treatment systems for the southern part Kyoto	• Governor	(1) 1969-70
	• Degradation of living environment	Improvement of transportation system	Environmental management program			
	• Traditional culture & nature	Preservation of natural & historical landscape coupled with an increase in tourist requirements	Rationalization of land use			
	• Industrial structure & local industry	Comprehensive industrial & development directed at machinery & local industry	Construction of industrial parks for local industries	• Construction plan for Osadano industrial park, located in depopulated area	• Advisory Council for CDP	(2) 1971-85
SHIGA ④	• Industrialization & population increase	Stable growth of industry & population which provides employment	Selective introduction of non-pollution type industry	• Lake Biwa Comprehensive Development Plan	• Governor	(1) 1976-77
	• Culture & education	Creation of human & local community	Funding from other related prefectures & government		• Advisory Council for CDP	(2) 1978-85
	• Joint community on Lake Biwa basin	Preservation of nature & water in Lake Biwa	Non-automobile type of tourism & recreation zone		• Public assembly	
	• Recovery of agriculture	Development of Kinki region as a water & agriculture base	Environmental management system - total amount of control for water quality -			

the mutual understanding and communication between residents and local governments [11]. The Osaka CDP comprises the Basic Framework, Basic Plans, and Sub-regional Plans at three different levels. The Basic Framework defines the following common issues and the basic indices involved in the tasks which Osaka prefecture faces, and describes some perception of the common problems and future directions for all individual tasks and goals:

(1) population,

(2) land,

(3) resources,

(4) discrimination*,

(5) consumer price,

(6) regional finance, and

(7) development.

With respect to the regional finance problem, there exists a rather severe attitude towards the current financial crisis stemming from the enormous increase in rigid administrative requirements. A method is suggested to improve the existing regional finance system from centralization to a delegation in terms of the tax reallocation scheme and revision of subsidy standards. The basic plan consists of five fundamental sectors in which Osaka prefecture should attack the fundamental issues such as social, environmental, cultural, economic and sub-regional developments. The importance of utilizing systems analytic tools for policy implementation is emphasized in order to make the interdependence among the goals clear and to seek a solution in a comprehensive way.

As for economic and regional development plans, particular emphasis is put on the reorganization of the regional structure to facilitate various socio-economic and cultural activities, not only between the Osaka city area and the suburban area within the prefecture itself, but also between adjacent prefectures in the Kinki region as a whole. The other important problem discussed in the plan is how to restore Osaka's socio-economic level after its decline of central management and decision-making. Another area of concern is how to rebuild the Kinki area into a series of attractive megalopolises which will comprise several cities having their own particular characteristics.

There are, of course, differences among the four PCDPs in Table 5 depending upon the current socio-economic situation and historical and geographical background. But although there

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*In the Kinki region some discrimination still exists against some types of business people - mainly connected with past affiliations.

are many different types of statements to express goals and instruments, we can easily find some common feature from Table 5.

- conversion from a development-oriented policy to a welfare and environmental preservation one;
- emphasis on the formation of a local community based on local culture and characteristics;
- innovation in industrial structure towards a pollution free and knowledge intensive type;
- public hearing and participation in the planning process of CDPs.

These characteristics are also confirmed in the survey report by the Ministry of Internal Affairs [1]. A more detailed goal tree of the Osaka prefecture CDP is illustrated in Table 6.

In the case of the Osaka Prefecture, the planning process for the new long-term development program began in 1972 with an inquiry of the governor to the advisory council for CDPs. The council is made up of a general assembly and six expert working committees to study issues such as:

i) basic framework,

ii) environment and disaster prevention,

iii) urban facilities,

iv) welfare and health care,

v) education and culture, and

vi) industry and economy.

The council has 42 regular members who represent the prefectural assembly, city and municipality and various other parties and citizens. In addition, in order to form the expert working committees, the council has 25 expert members most of whom come from universities and research institutions associated with the Kinki area. Figure 3 describes the actors involved in the planning process as well as the linkages in terms of information flows and procedures. The other prefectures which we visited have more or less the same type of planning mechanisms and processes.

Public participation (citizen participation) in the planning process was a particular concern of the planning office of the Osaka prefectural government as was already pointed out in the central government report [1]. The main route of public participation is by sending public representatives to the council, for example, from:

Table 6 DETAILED GOALS OF REGIONAL DEVELOPMENT LATE 70s AND 80s

(Example of Osaka Pref. CDP)

Area of Concern	Goals	Instruments
Human & Welfare Society	Redistribution of resources to the weak	Local self-taxation system
		Stabilization of consumer prices
	Comprehensive health care system	Emergency medical system
	Formation of human community	Facilitation of community & voluntary activities
	Stable employment	Vocational training & education system
Human Environment	Preservation of nature self regulation capacity	Tightening of land use guideline
	Pollution-free environment	Environment management program - BIG PLAN -
	Disaster prevention by natural & artificial means	Application of PPP & a compensatory system for victims
	Formation of good living & working environment	Redevelopment of overcrowded urban areas
Cultural Development	Traditional & characteristic culture	Network of traditional culture facilities
	Role of culture & science center	Introduction of culture & science institutions
	Consolidation of education environment	Social education system for life
	Build-up of sports & recreation activities	Sports & recreation facilities in open fields
Formation of Megalopolis Zone	Attractive urban environment - green open space	Control of population & firms, further reduction in commuting time between job location & home
	Structural change from heavy industry to information & technology industries	Rationalization of energy & water resources utilization
	Formation of Osaka Megalopolis - open to western Japan	Adequate industrial siting & enlargement of trade & information processing functions
	Balanced regional structure - historical, geographical, autonomous	Comprehensive assessment of development plans

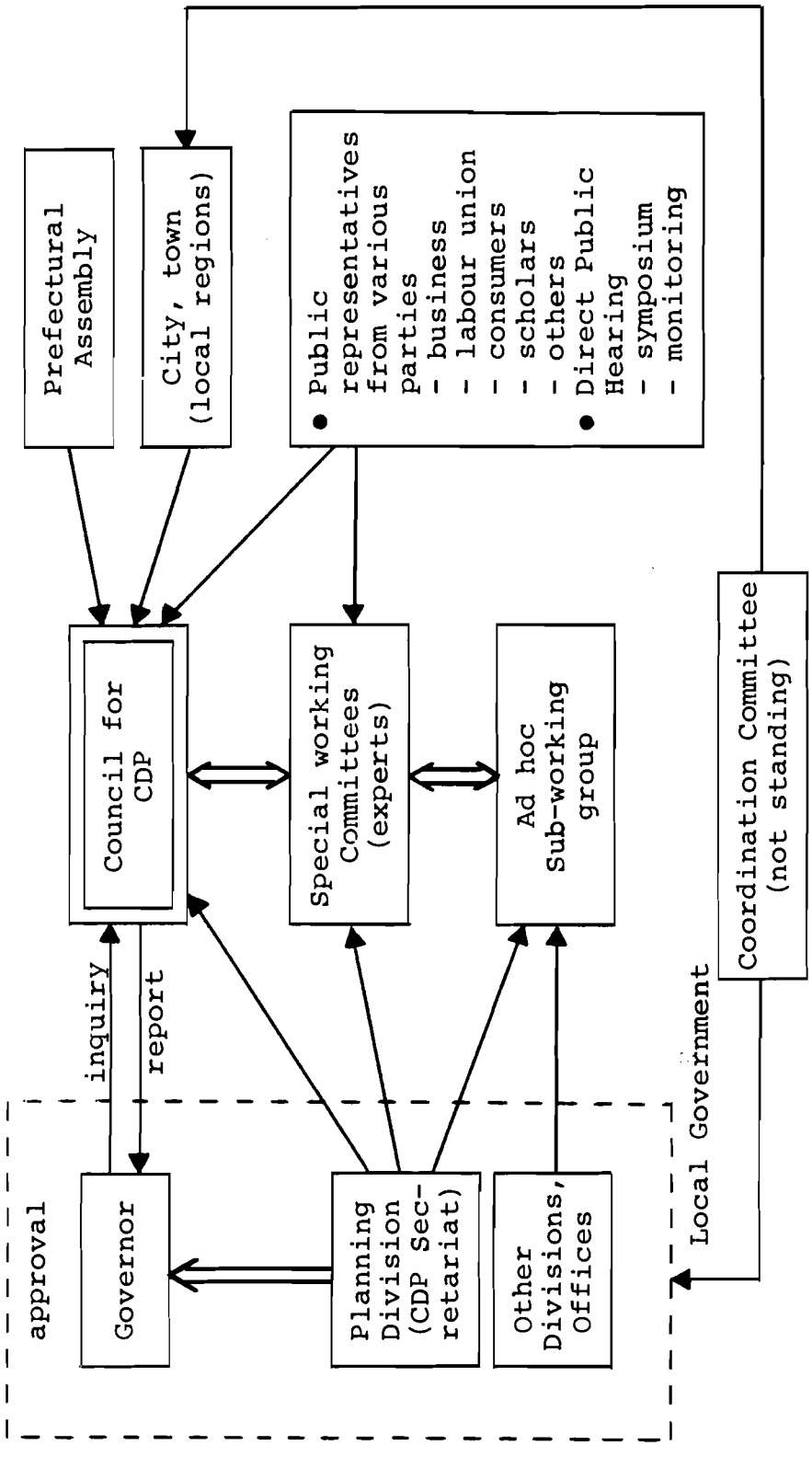

Figure 3 EXAMPLE OF OSAKA PREFECTURE'S PLANNING, ORGANIZATION AND INFORMATION FLOW

- two major labour unions,
- three big and local businesses,
- five newspapermen,
- two community associations,
- five welfare and health associations.

Another direct way of public participation is provided in the course of the planning process by holding a regional citizens' symposium. An example of Hyogo and Osaka prefectures is shown in Figure 4. However, there seems to be no formal procedure for dealing with public reactions and opinions to the planning and decision making process. Such formalizations appear to be still in the investigation stage.

2.4 Policy Instruments

Since budgeting is one of the major instruments for the realization of projects within PCDPs, this section will first look at the regional finance system and its relation to the national budget.

Figure 5 illustrates the relationship between national and regional finance taking the 1977 Annual Budget as a basis [8]. There are two main income sources for local government budgets. One is local taxation which flows directly into their revenue and the other is from the central governments - through various channels. The money allocated to the local government from the central government is assumed to be equal to the local tax income under the current taxation system where no strong restraints for its use are imposed. Thus, on the average approximately half of local revenue is under local control and the other half is more or less under the control of the central government. Although the scale of regional finance differs much among the prefectures and municipals, most of the prefectures have less than 45% of total revenue which can be used at their discretion. However, if one looks in detail at prefectural budgets, there is a big difference between the share of local tax and local allocation tax in the revenue of each prefecture. This is shown in Table 7. The local allocation tax is one of the major means to redistribute the revenue collected by the central government which helps decrease the imbalance in local government revenue. As long as a large difference exists among the prefectures in terms of area, population and economic resources, this local allocation tax readjustment scheme has always been a controversial issue. This is in conjunction with the allocation of national administrative work between central and local governments and this is summed up by the phrase "30% autonomy" which arose because only 35% of the total national tax goes to local tax.

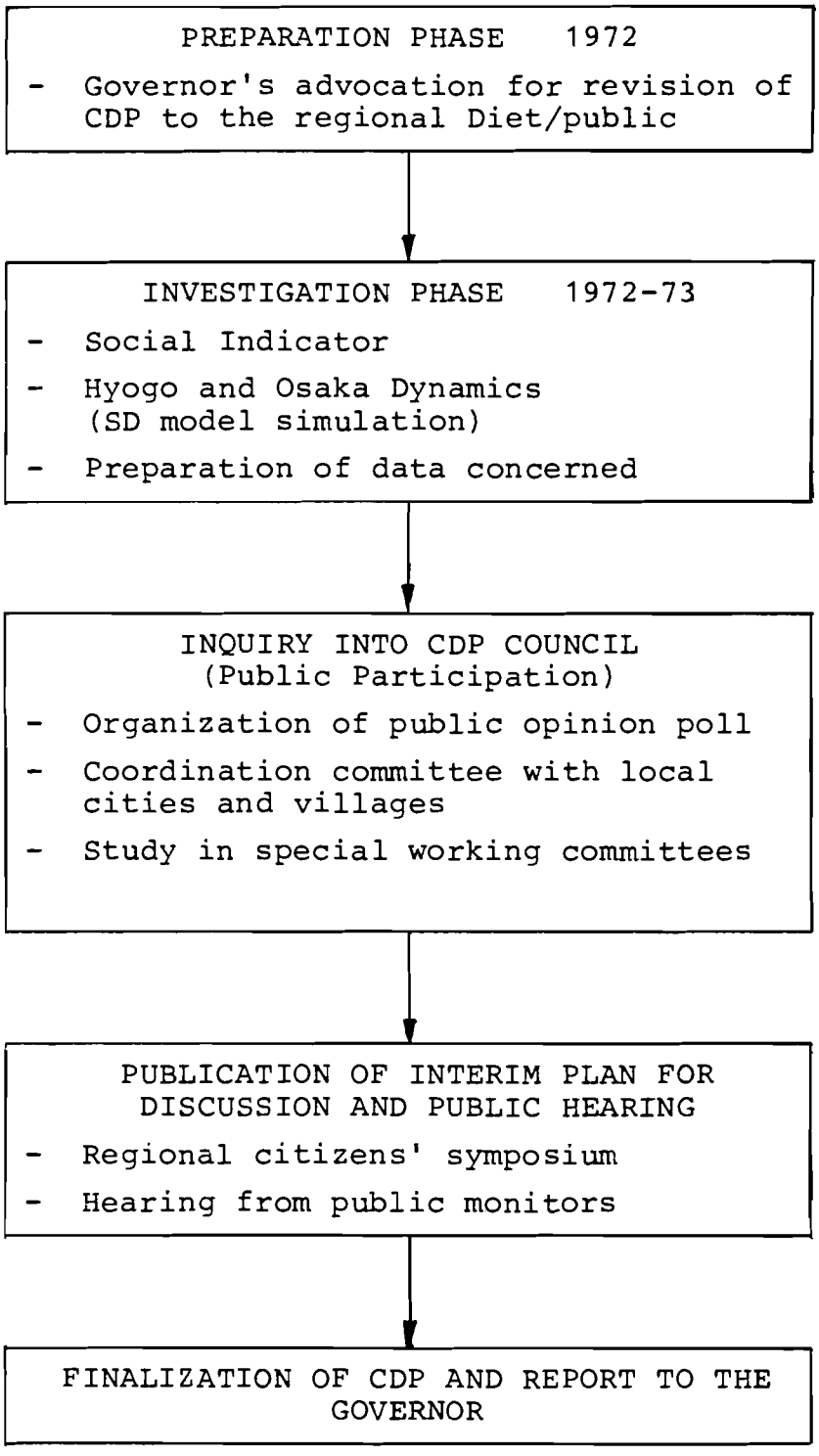

Figure 4 PUBLIC PARTICIPATION IN THE CDP PLANNING PROCESS
- example taken from Hyogo and Osaka prefectures -

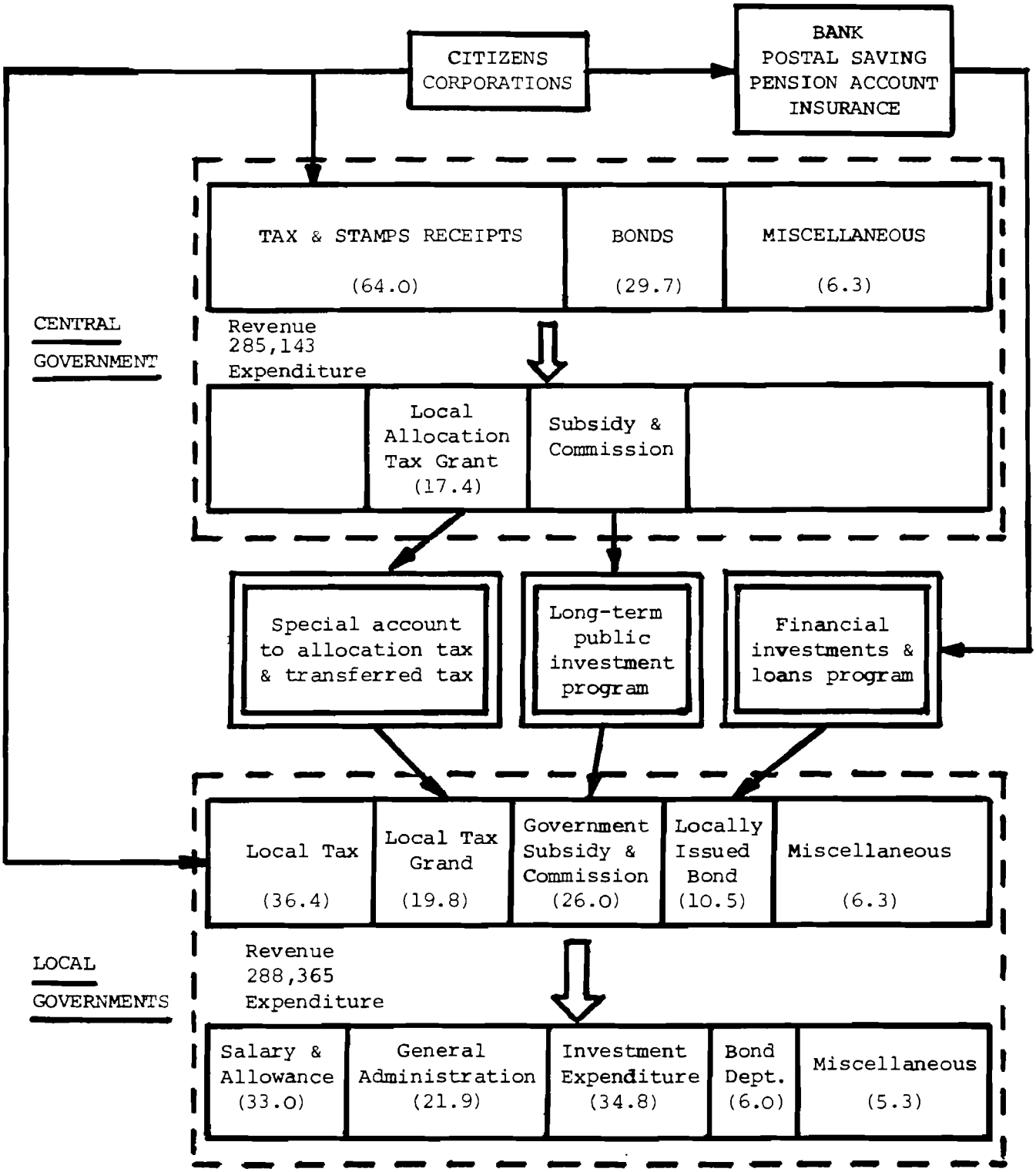

Figure 5 RELATIONSHIP BETWEEN NATIONAL AND REGIONAL FINANCE IN 1977*

(unit = $x10^8$ yen & figures in brackets denote percentage of total)

* SOURCE: Finance in Japan - illustrated introduction; ed. by H. Ohtake, Ministry of Finance, 1977 edition, Toyo-Keizai-shinpo Co.

Table 7 SHARE OF AUTONOMOUS BUDGET TO PREFECTURAL REVENEUS

	LOCAL TAX (A)	LOCAL ALLOCATION TAX (B)	NATIONAL EXPENDITURE	LOAN & BOND	MISCELLANEOUS	(A)+(B)
OSAKA	45.9	0.7	18.6	18.5	13.5	46.6
HYOGO	34.5	10.6	26.7	14.6	13.6	45.1
KYOTO	25.5	17.0	23.7	4.7	11.9	42.5
SHIGA	22.5	21.4	26.8	10.3	19.0	43.9

(unit %, 1975).

Prefectures have about 40% autonomy in terms of budgeting discretion as shown in the far right column of Table 7. However, since expenditure is mainly on personnel (approximately 33.0% of total expenditure including education, police and health services staff) and general administration, construction of infrastructure cannot operate in an efficient way without obtaining the financial support (subsidy) of the central government. For instance, in the case of the sewage treatment system in Lake Biwa and the Yodo River basin the prefecture government could introduce a subsidy from the central government in accordance with the framework of the long-term sewage development program under the Ministry of Construction. For a main line sewage treatment system the share of central government, prefectural governments and municipals would be 2/3, 1/6, and 1/6 respectively. For a sewage branch line system, the central government will bear 3/5 of the total investment and the rest must be shared by the municipals involved with the system [9].

It is clearly seen in Figure 5 that the central government has three typical policy instruments in terms of financial control:

- a general governmental subsidy for a particular project according to the framework of the public investment allocation program;
- sanction or guidance for a locally issued bond according to the framework of the financial investment and loan program;
- a local allocation tax or transfer tax according to the framework of the special account scheme, although this special account is legally bound by the current taxation system.

Returning to the problem of special financial measures associated with the Kinki Basic Development Plan shown in Figure 2, three types of measures have been used:

i) to raise the percentage of the grant or subsidy to be borne by the central government for the provision of basic infrastructure, mainly the construction of transportation and communication facilities;

ii) to authorize prefectures to issue local bonds for housing, roads, ports, etc., and to subsidize the payment of interest on such bonds;

iii) to provide incentives to industry, mainly in the form of fiscal concessions or special depreciation provision to promote the relocation of industry.

We will see later how these policy instruments have been applied in the case of Lake Biwa Comprehensive Development Project which is an example of integrated physical projects in the Kinki area. Here it should be noted again that prefecture governments would like to use their CDPs as a strong policy instrument in itself, although it seems to be extremely difficult to attain their goals without receiving financial support from the central government.

2.5 Integration Attempts and Large-Scale Projects in the Kinki Region

Up to this point we have analyzed the legal framework, organizations, planning processes and policy instruments with regard to the goals of prefectural CDPs. Among various issues associated with CDPs, we have been particularly concerned with the funding problem as one of the most important policy instruments. The next issue to emerge from the preceding analysis is the consistency of the prefectural goals within their development programs and also between prefectures and the central government. It is also understandable that the integration of prefectural goals and policy instruments into the Kinki region as a whole become necessary for particular issues such as transportation systems and environmental management systems which is clearly stated in all prefectural CDPs.

The Kinki Redevelopment Agency (reorganized as part of the National Land Agency) should have had the role of a core actor to ensure consistency in the CDPs within the framework of the Kinki BRD which is part of the National CDP. As already mentioned in the previous section, prefecture governments pay much attention to the welfare of the local residents and to a well-balanced socio-economic and cultural structure. These aims are not necessarily consistent with the national goals and possibly not even for the Kinki region as a whole. In this regard, Table 8 lists some issues with respect to the consistency and integration problems of prefectural CDPs and national CDPs.

Table 8 ISSUES CONCERNING CONSISTENCY AND INTEGRATION OF PREFECTURAL AND NATIONAL CDPs

	CENTRAL	PREFECTURE
FRAMEWORK OF REGIONAL PROBLEMS	- Macroscopic goals - Abstract description for the goal limitations - Stable socio-economic growth	- Need for microscopic view - Individuality and locality - Well-balanced structure
FINANCIAL PROBLEMS	- Subsidy - main control policy for each physical project - Specific financial measures	- Need for central government subsidy - Search for financial freedom
LARGE-SCALE PROJECTS	- Core developer - Public investment allocation (dominant power)	- Subordinated - Necessity for precoordination within prefectural projects
GLOBAL TRANS-FRONTIER PROBLEMS (pollution, water resources, transportation, etc.)	- Coordination - Organizational change	- Regional interest - Budget transfer

The large scale projects sponsored by the central governments have been one of the strongest tools for consistency between CDPs by controlling public investment for particular physical projects within the national framework. However, there is an interesting finding associated with inter-prefectural large-scale projects in the Kinki region. As already described in the introductory section the Kinki region currently has three typical large-scale projects which might facilitate integration between prefectural development goals: (i) the Lake Biwa Comprehensive Development Plan, (ii) the Seto Inland Sea Environmental Preservation Plan, and (iii) the New Kansai International Airport Plan.

The first two plans have a legislative framework which created in 1972 and 1973 respectively. The last one is now in the pre-planning stage involving various administrative organizations which include not only the MOT of the central government and related prefectural governments, but also various institutions such as the Institute for Environmental Research on the

Kansai International Airport Plan. This is sponsored by Osaka Prefectural Government whom we interviewed [16]. The Lake Biwa Comprehensive Project is an example of the recent tendency to use a regional development mechanism as a means of integrating the Kinki region with respect to water resource problems. The chief aim of the project was to promote a sound development of the Kinki region, particularly for meeting the water demands in the Kyoto, Osaka, Kobe area (downstream urban area) and preserving the natural environment of the lake basin. The following is a description of the project [17]:

- Target Period: 1972-81.
- Main Objectives:
  - preservation of Lake Biwa Basin
  - flood control and water resource preservation
  - utilization of water in the downstream area
- Core Actors:
  - Planner and Decision Maker: Governor of Shiga Prefecture
  - Final Approval: the Cabinet under the Prime Minister
  - Developers: Ministry of Construction and Water Resource Development Corporation
  - Users: Osaka, Kyoto, Kyogo prefectures
- Budget:
  - total investment 426.6 (planned figure in $x10^9$ yen in 1972)
  - central government 183.8
  - Shiga Prefecture 151.2
  - local Prefecture (downstream) 69.4
  - Public Corporation 23.2
- Major Physical Plans
  - increase of water supply to $40m^3$/sec.
  - improvement of sewage system
  - erosion and flood control of the river basin
  - construction of green and recreation zones.

The 1972 Act demands specific conditions for carrying out the project in this area due to the necessary coordination between down- and up-stream areas. The decision making function is delegated to the Governor of the Shiga Prefecture (up-stream). This was the first attempt that was made to transfer funds from local government users to local government developers in terms of compensating for the detrimental impacts. This provides the project with two specific methods of integration:

(1) The living environment of those people who are residing in the area concerned with the project should be consolidated and their welfare promoted.

(2) The necessary fund is to be financed by and adjusted by the central government and related local governments in proportion to the benefits they may gain.

At present only 51.6% of the total planned funds have been invested. The planned physical project is about 32% completed and a fund of 7.9 billion yen was transferred from the prefectures down-stream in order to improve the sewage treatment system, etc. However, the Shiga prefecture is now undertaking some re-planning taking into consideration recent changes in the socio-economic conditions and people's attitudes towards the protection of the natural enviornment. Particular emphasis is put on the preservation of water quality of the Lake and protection of the natural environment in the Lake Biwa area. This necessitates further investment and coordination between the central and related local governments. This problem will be discussed in more detail in the environemntal management section.

2.6 Observations

The main observations of this section are summarized in Table 9. This table attempts to summarize the issues associated with PCDPs in the Kinki region from the viewpoint of vertical and horizontal integration and consistency. The organizational, planning and budgeting aspects are stressed as we found that there is a need for both vertical and horizontal integration between levels.

With regard to the organizational aspect we see a clear separation of planning functions both in the central and local governments. For example, in the central government the National Land Agency (NLA) is responsible for the basic goals and direction of National land-use. The Economic Planning Agency (EPA) is in charge of socio-economic plans and coordination of public investment allocation for the construction of nation-wide infrastructure. Various ministries such as MOT, MOC and MITI have the responsibility for planning and execution of long-term physical programs. On the other hand, each prefecture emphasizes their own individuality and regional autonomy, and only a few attempts have been made to integrate and coordinate CDPs - such as governors meetings, joint

Table 9 OBSERVATIONS: INTEGRATION AND CONSISTENCY IN THE COMPREHENSIVE DEVELOPMENT PLANS

	VERTICAL INTEGRATION	HORIZONTAL INTEGRATION
ORGANIZATION	• KRA (part of NLA) has no strong integration function • Separation of planning functions - NLA: Basic goals and directions - EPA: Socio-economic plans - Ministries: Long-term physical programs	• Emphasize individuality and regional autonomy • Little attempt for PCDP integration • Encourage public participation in CDP planning • Leading role of prefectures in Kinki region
PLANNING	• Stress on continuing socio-economic growth • Sectorial administration rather than integrated • Change of attitude from top-down policy formation to: trade-off between bottom-up and top-down policies (3rd NCDP)	• Well-balanced socio-economic structure • Rectify imbalance of income and quality of life • Need the integrated view for individual physical projections in inter-prefectures
BUDGETING	• Subsidy is strong control instrument from central government • Specific measures for specific regional development programs	• Search for more financial freedom • Necessity of severe financial allocation under limited resource • Need of budgetal coordination in coping with inter-prefectural issues

committees on particular subjects such as water quality, transportation, etc. The Kinki Redevelopment Agency (KRA) has had no strong integration function in improving the consistency among organizational levels.

In planning we also see a clear difference between central and local governments, one stressing the importance of continued national socio-economic growth, the other preferring a well-balanced socio-economic structure within each territory rather than specializing the role of each prefecture. However, we also perceived a possibility for future integration at both levels, i.e., a change in the central government attitude from a top-down policy formation to the policy of establishing a mix between top-down and bottom-up policies (from local goals to national goals) giving priority to the latter; also, in the local government there is a need for a more integrative view of the individual physical projects within the prefectures.

There have been some attempts to gain more financial freedom but the subsidy and special financial measures provided by the central government are still strong control instruments in terms of consistency and integration between various plans and projects.

In general, although we observed the importance of having an adequate regional autonomous capacity backed by financial discretion, there is a need for a policy formation body at the regional level actually acting from within the region and not from outside. This body should aim at integration and making the prefectural CDPs consistent with each other in the Kinki region as a whole.

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3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

The improvement of the environment is a central issue in the comprehensive prefectural development plans, as was shown in the previous section. Our study, therefore, looked more deeply into the way in which prefectures and cities in the Kinki region plan and manage for environmental protection and preservation. Since the focus of this study is on the regional aspects, rather than on single cities or prefectures, stress will be put on environmental problems which are shared by the prefectures in the Kinki region and which require some integrative management approach. Typical for such joint problems is the problem of pollution transfer and, in particular, that of water quality management for the Yodo River basin. Other environmental problems, such as local air pollution or park preservation, are only discussed as far as they serve to highlight the particular relationships between central government and regional authorities.

The structure of this section is as follows. First, a brief survey of trends of environmental indicators will be given for the Kinki region. On the basis of these data, several classes of environmental problems will be identified which appear typical either for Japan as a nation, for Kinki as a region, or for particular prefectures. The organizational set-up, the environmental plans of each prefecture, the budgeting mechanisms for environmental preservation, and the research (modeling) for environmental management will then be discussed as those solution approaches which are crucial for a regional environmental management approach. The section will close with some observations about present limits for integrative management approaches.

3.2 Some Environmental Problems in the Kinki Region

Figures 6 - 8 show the trends of the main indicators of air pollution for selected cities in the Kinki region and for the nation as a whole [1-4]. As can clearly be seen, SO_2 pollution has been successfully controlled, which is a well-known national achievement of Japanese environmental management. Osaka, in particular, beginning with a poor SO_2 record has now reached the national average. The picture for NO_x looks less favorable. Indeed, there has even been an increase in NO_x pollution for most cities over the last 10 years. There has been some improvement in CO pollution, but Kyoto city lies well above the national average. Other air pollutants, not graphically depicted here, are hydrocarbon from car exhausts, particulates, and photochemical smog. Most prefectures in the Kinki region seem most concerned about the photochemical smog problem. Thus,

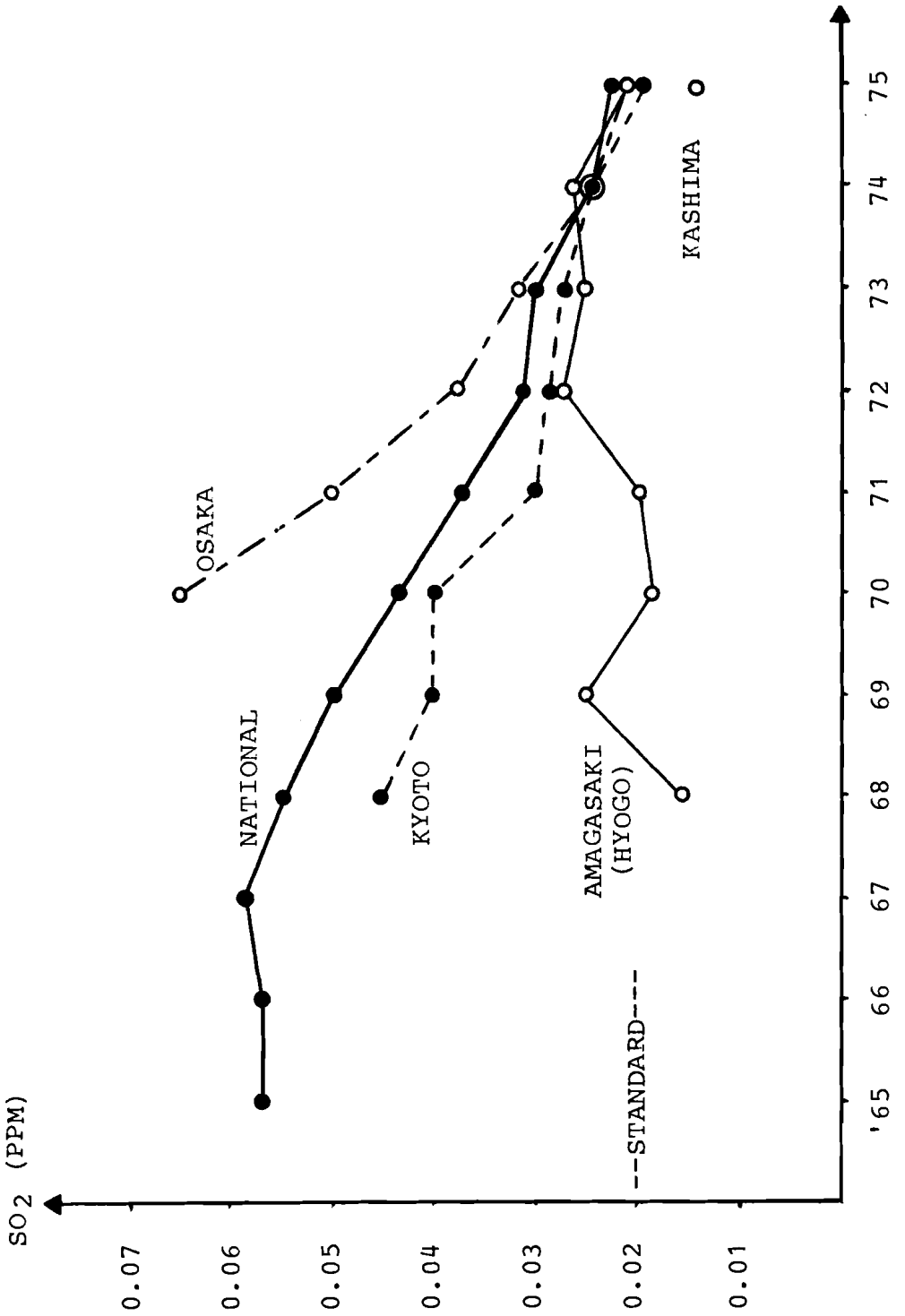


Figure 6 AVERAGE ANNUAL SO_2 CONCENTRATION

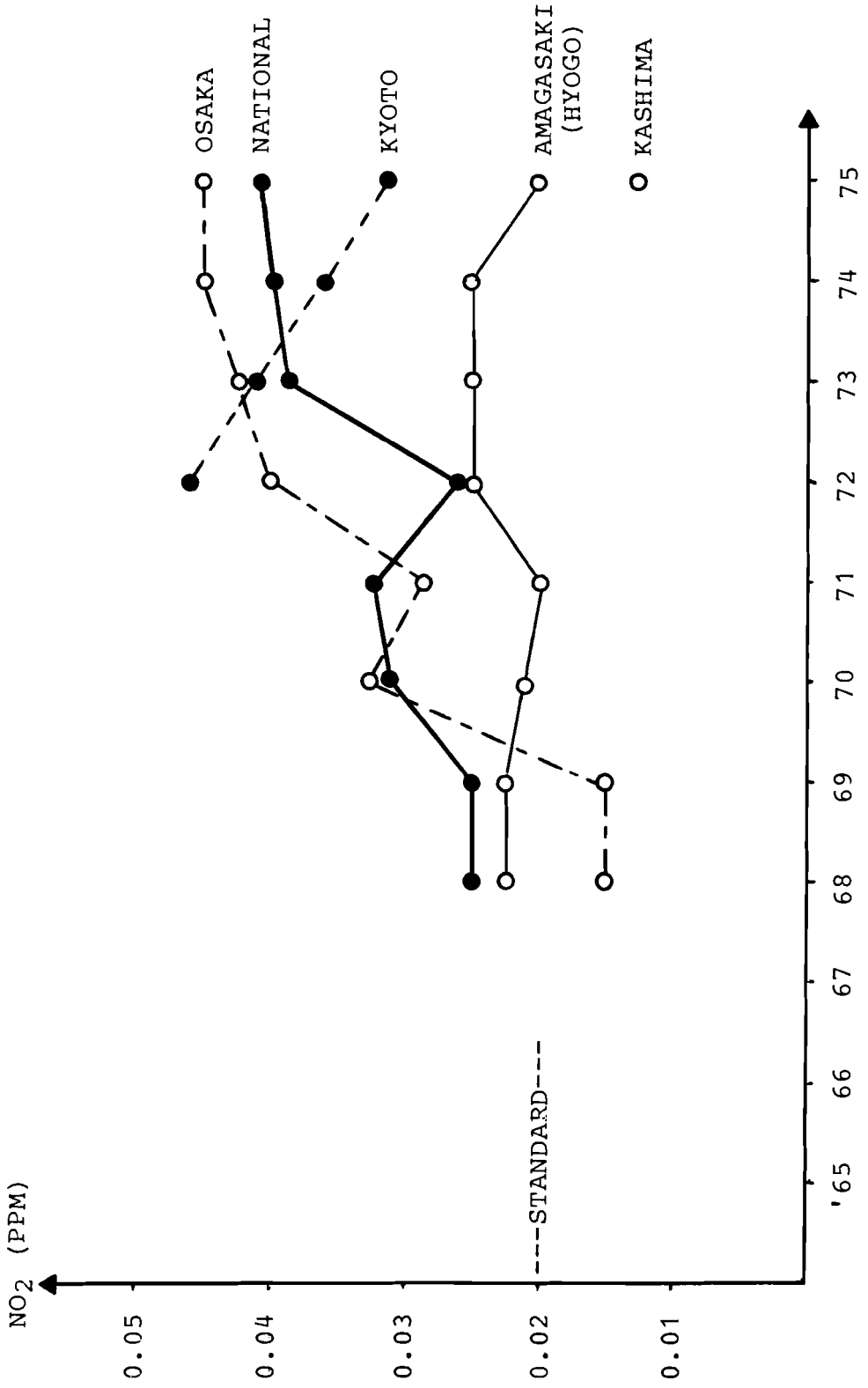


Figure 7 AVERAGE ANNUAL NO_2 CONCENTRATION

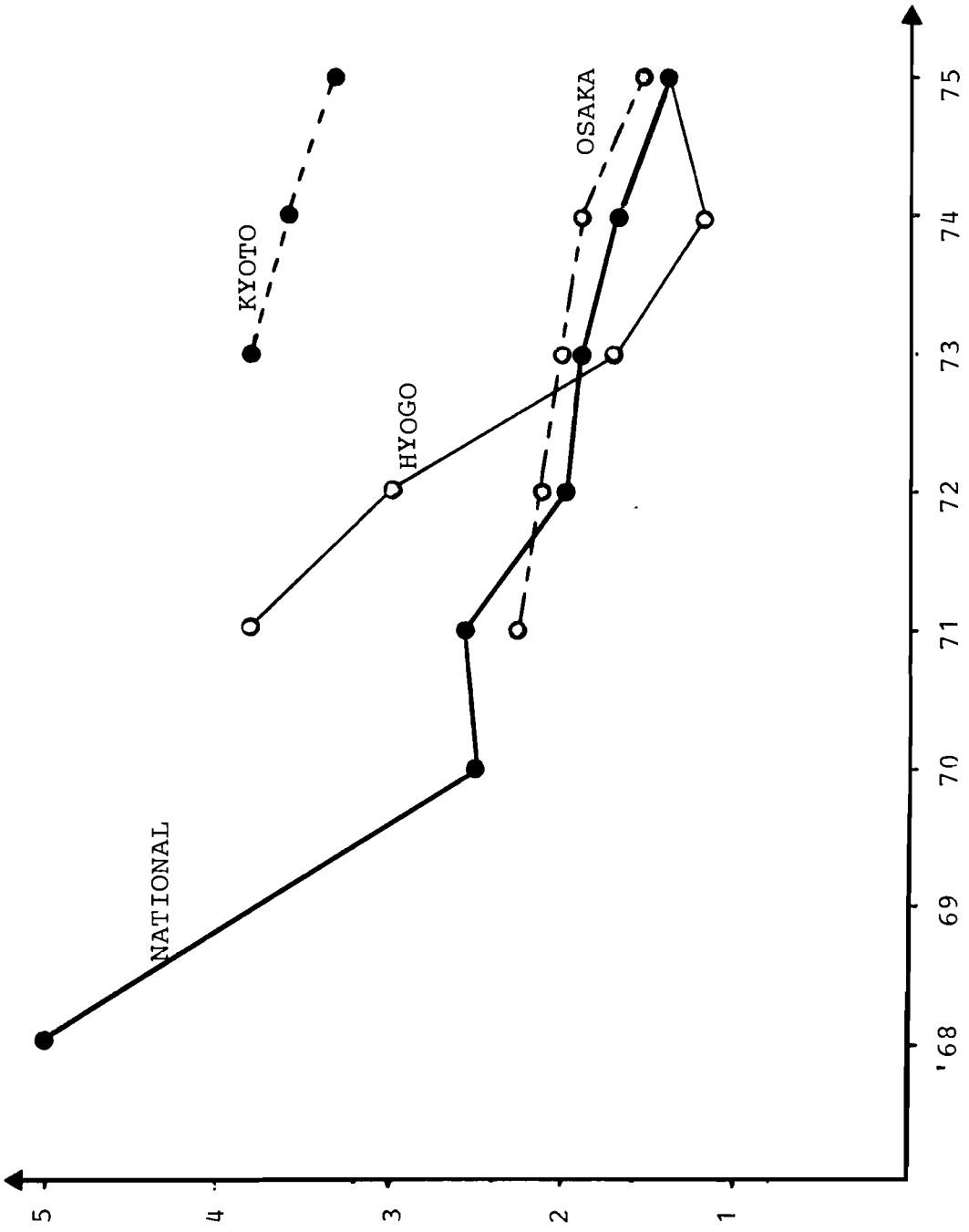


Figure 8 AVERAGE ANNUAL CO CONCENTRATION

while SO_2 pollution is controlled, NO_x and photochemical smog are now considered the main air pollution problems in the Kinki prefectures, as well as in the whole nation.

The three main environmental problems arise on the side of water pollution: first, the pollution of Lake Biwa, secondly, the pollution of the Yodo River basin through municipal and industrial wastes, and, finally, the pollution of Osaka Bay. These three systems are linked together as shown in Figure 9. Figure 9 also shows, as a main indicator of river pollution, various BOD levels in the Yodo River basin [4,5]. As can be seen from Table 10, the general water pollution pattern in the Kinki region is not much worse than in the nation, with approximately 23% of all samples taken from the waters in the Kinki region still exceeding the environmental quality standard, as compared to 20% in the nation [4]. The reason for the problem of the pollution of the Yodo River basin as well as Lake Biwa and Osaka Bay is mainly a lack of sewage systems. In 1976 only 36.4% of the municipal and industrial wastes were connected through sewage systems (see Table 11). Particularly drastic is the picture in the Shiga prefecture, where up to now 4% of the wastes are treated in sewage systems [4]. This problem is a central one for the Kinki region and it has been recognized by all prefectural pollution control boards that it requires a joint regional solution.

Among the remaining environmental problems, most prefectures mentioned noise pollution as a major source of complaints in Japan. Indeed, several legal battles have been fought over air, Shinkansen and road noise, and now noise is a very hot environmental topic, nationwide. Clearly, such a problem cannot be solved by single prefectures but requires a national solution. Such steps have been initiated by various environmental quality standards which have been issued for noise by the Environment Agency of Japan.

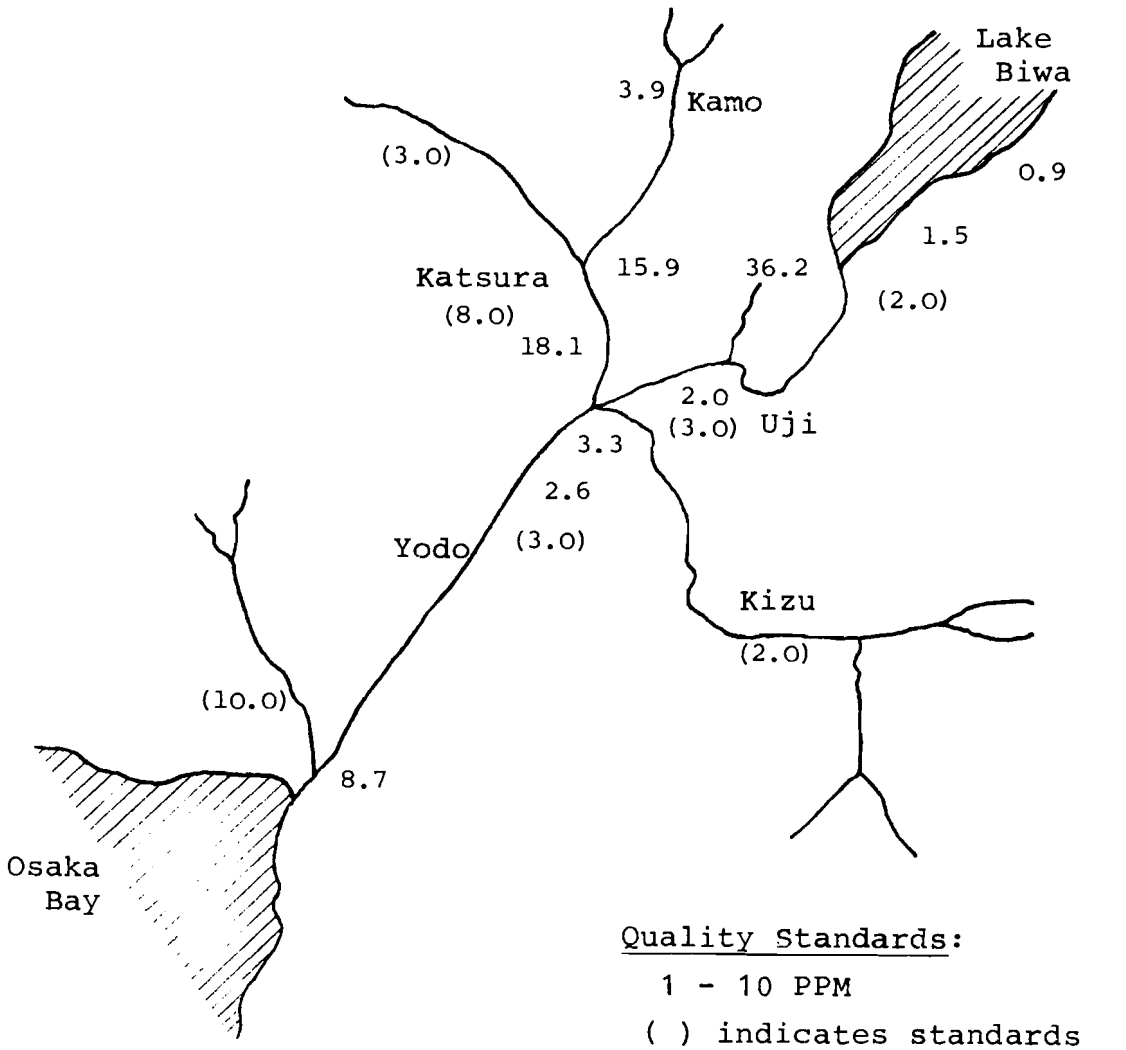
Most other environmental problems in the Kinki region do not have any typical regional characteristics, such as the problem of ground subsidence, bad odor, cultural preservation (particularly in the Kyoto area), etc. They were, therefore, not a focal point of this study. The above problems can be classified in three different types:

1. local problems particular to a prefecture or a city, which can be solved by the city or prefecture alone (e.g., Kyoto city cultural preservation),

2. regional problems which involve several prefectures or all prefectures and which require a joint solution (e.g., air pollution transfer, and Yodo River basin),

3. national problems, which all prefectures have, to some degree, which require a national solution in cooperation with each prefecture (most local air pollution problems, noise, etc.).

Figure 9 AVERAGE ANNUAL BOD LEVELS AT SELECTED POINTS ALONG THE YODO RIVER BASIN



Source: [4] and [5]

Table 10 TOTAL SAMPLES MEETING ENVIRONMENTAL QUALITY STANDARDS

	K I N K I			N A T I O N		
	Samples	Exceeding EQS	%	Samples	Exceeding EQS	%
Rivers	15,332	3,546	23.1	212,211	45,280	21.3
Lakes	592	258	43.6	11,607	4,461	38.4
Coastal Sea	3,669	772	21.0	78,337	12,626	16.1
Total	19,593	4,576	23.4	302,155	62,367	20.6

Source: Kinki mimeo

Table 11 PERCENTAGE OF COMPLETED SEWAGE SYSTEMS

	1973	1974	1975	1976	1977
Shiga	2.5	3.2	3.5	3.9	4.0
Kyoto	29.9	30.5	30.6	32.8	35.0
Osaka	42.3	45.9	47.0	51.3	54.0
Kyogo	27.5	28.1	30.6	37.5	41.0
Kinki All	28.0	29.6	30.7	34.4	36.3
Nation	18.5	19.5	20.5	32.8	34.0

The latter two types of problems require integrated approaches. Two types of integration approaches may become necessary: vertical integration between national, prefectural, and city governments in the national problems which require close cooperation between the Environment Agency, other ministries, and the local authorities; and horizontal integration between prefectures in the region for those problems which are shared by the regional prefectures.

One could think of several integrative approaches. Only four appear to have their special relevance in the Kinki region as either furthering or hindering integrative enrivonmental management: organizational, planning, budgeting, and modeling approaches. We will discuss how these approaches are realized in the different prefectures of the Kinki region and how well these approaches fulfill their integrative role.

3.3 Organization for Environmental Management

Figure 10 presents the organizational structure for environmental management on the national level [6]. The Environment Agency itself has several pollution sub-branches as well as offices for regional and international affairs. Other coordinating roles are occupied by the planning and coordination division. The Central Council for Environmental Pollution Control is the main research and advisory body to the Environment Agency. Also attached to the Environment Agency in its research capacity is the National Institute for Environmental Studies (NIES). Figure 11 presents a typical example of prefectural environmental organization [2]. Almost all Japanese prefectures now have pollution control sections built into their organization. They typically belong to the Division of Public Health which also has other obligations, such as medical services, etc. As with the Central Council for Pollution Control, the prefectural governor also has advisory councils for pollution-related matters, as well as standing pollution control conferences, in which all prefectural ministers participate. A similar structure can then be found on the city administration level. Figure 12 gives the example of Kyoto city [7].

These three layers are coordinated in several ways: first, by a division of the functions; secondly, by joint committees, councils, and conferences. The functional division is presented in Table 12 [6]. It shows that the main functions of the Environment Agency are coordination, the setting of nationwide quality standards, and some enforcement standards, as well as designation of pollution control areas. The main functions of the prefectural pollution control agencies are development and adaption of prefectural pollution control plans, including setting of emission standards and total amount emission control schemes. Furthermore, they have tasks such as monitoring, altering and alarming, and the handling of complaints. The level of the city is, at least for large cities, not much

Figure 10 NATIONAL ORGANIZATION FOR ENVIRONMENTAL POLLUTION CONTROL

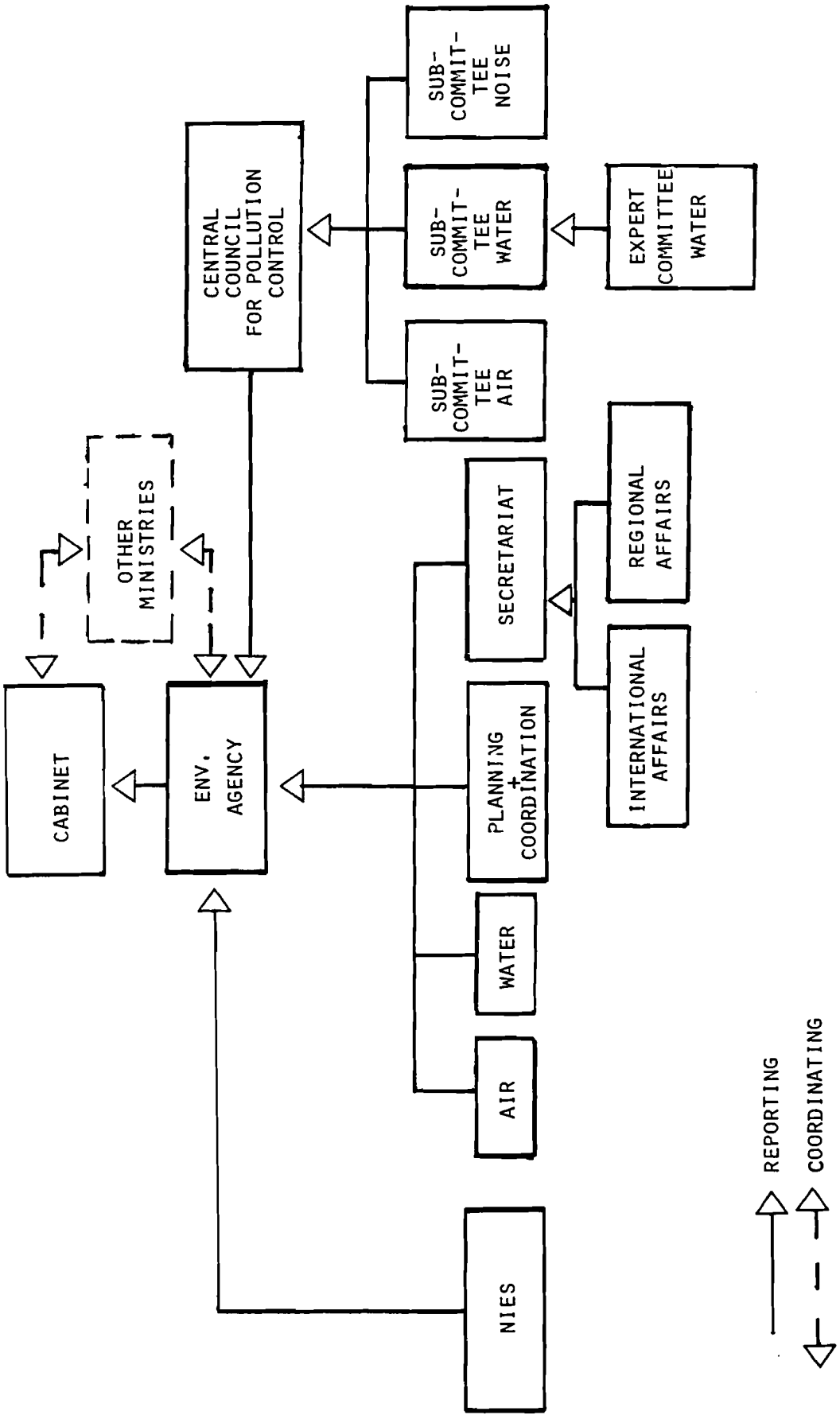


Figure 11 PREFECTURAL ORGANIZATION FOR ENVIRONMENTAL MANAGEMENT

(EXAMPLE: KYOTO)

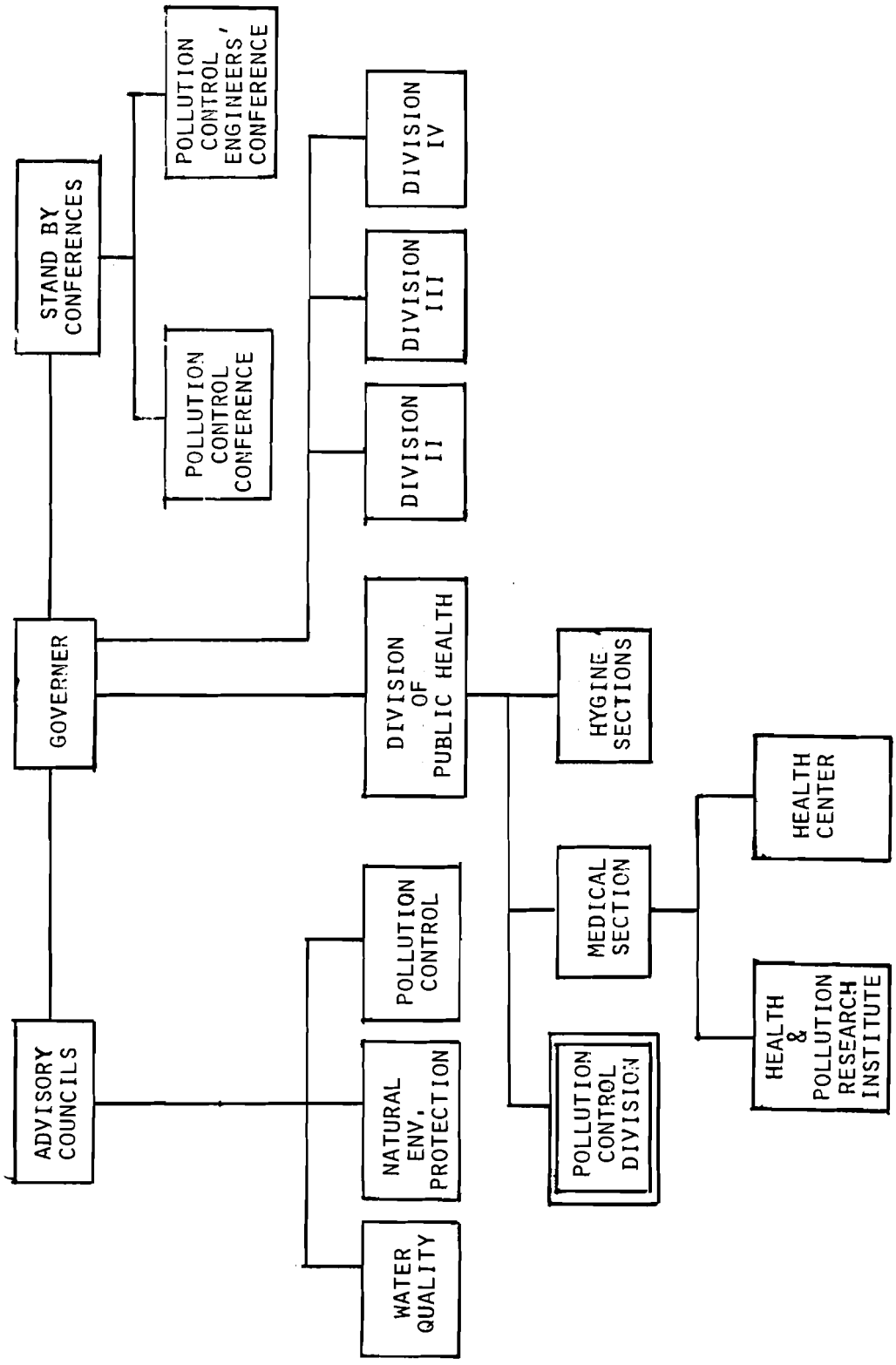


Figure 12 CITY ORGANIZATION FOR ENVIRONMENTAL MANAGEMENT

(EXAMPLE: KYOTO)

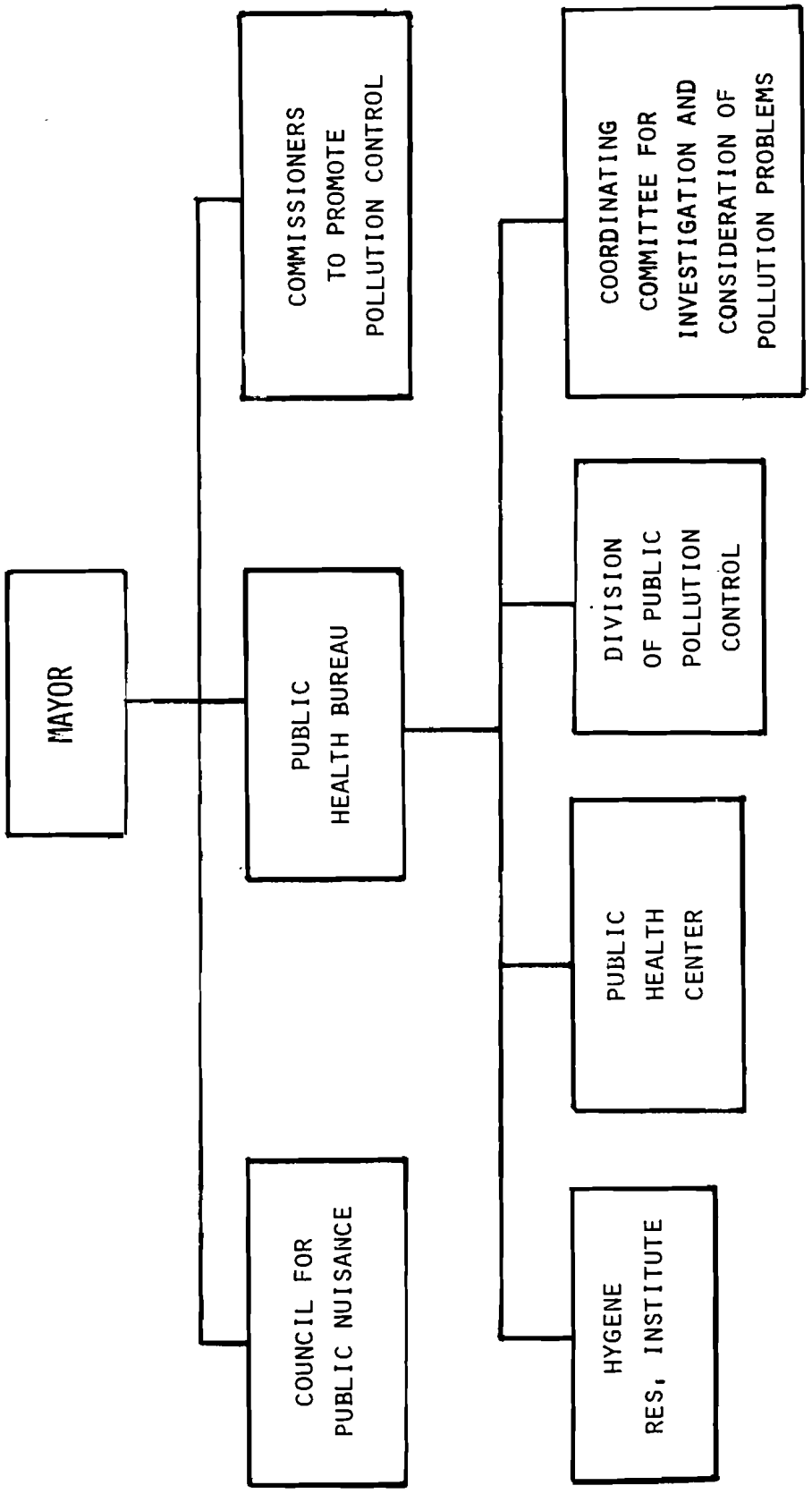


Table 12 MAIN TASKS OF ENVIRONMENTAL MANAGEMENT BUDGET

	National (Env. Agency)	Prefectural (Divisions of Public Health)	City (Public Health Centers)
Establishment of Standards and Regulations	o Env. Quality Standards o Some Emission Standards o Pollution Control Areas, K-Values (Air) o Coordination of Control Plans	o Supplementary Standards o Total Emission Control o Implementation and Control	o Implementation and Control (Choices)
Surveillance, Control	o Coordination o Data Analysis	o Monitoring o Alerts and Alarms o Control	o Most Control Functions
Provision of Env. Protection Facilities	o Pollution Survey and Research o Pollution Control Public Works	o Sewage Systems o Industrial and Domestic Waste Treatment	o Sewage Systems o General Waste Disposal Facilities
Handling of Complaints and Compensation	o Data Analysis o Compensation Measure and Legislation	o Handling of Complaints o Certification and Payments	o Handling of Complaints o Certification and Payments

different from the prefectural level, although cases in which cities set their own standards are not very common. The city functions are more directed towards implementation and control.

Various approval schemes and meetings between the different layers of environmental decision making support a vertical integration. Prefectural representatives, for example, take part in the decision-making process for quality standards, and Environment Agency representatives have to approve special pollution control-programs in prefectures. In general, it appears that the three layers have relatively clearly separated functions, and are well coordinated in their decision making. Horizontal integration, however, appears less effective. There exist several committees and conferences for special regional pollution problems, e.g., the Water Quality Council in the Kinki region. However, there is no direct coordination body which would be responsible for an integrated management of the Kinki environmental problems.

3.4 Environmental Planning

Each prefecture which we interviewed during the field study had elaborated medium-term (10-year) environmental plans as part of the comprehensive development plans [8-11]. Table 13 summarizes the main features of these plans. There is, of course, much similarity and repetition when looking at the details of the different prefectural plans. However, some cases are slightly different, and those we will highlight now.

There are some differences in the perceptions of the problems in the four prefectures. In Osaka, noise was stressed much more than in other prefectures. Osaka had, of course, the problem with Shinkansen noise and airport noise, which recently led to law suits. Also, the new Kansai airport which is presently planned to be located off the shore of Osaka raises the noise issue. In the Kyoto prefecture Yodo River pollution was mentioned as the most severe problem. In Hyogo the coastal pollution was stressed, while in Shiga the pollution of Lake Biwa and the lack of sewage systems was pointed out.

Prefectures also differ somewhat in targets and goals. All prefectures intend to achieve the national environmental quality standards by 1981. With respect to the sewage system, the Osaka prefecture is most ambitious, attempting to increase sewage facilities up to 90% in 1981. Shiga is much more modest, and has to be, considering the poor starting point of this prefecture (4%). Osaka set special standards and target dates for N and Ph which have not yet been set on a national level. This is one of the examples where prefectural decision making precedes the national one, a case which is not too uncommon.

The instruments and tools conceived in the prefectural plans for achieving these targets differ little. Most notable is, perhaps, that Osaka and Hyogo prefectures are developing

Table 13 CONTENTS OF PREFECTURAL ENVIRONMENTAL CONTROL PLANS

	1973 - 1985 OSAKA BIG PLAN	1975 - 1981 KYOTO ENV. PLAN	HYOGO ENV. PLAN	SHIGA LAKE BIWA PLAN
MAIN PROBLEMS AREA OF CONCERN	o NO_x, O_3 (Oxident) o Noise (Airport) o Osaka Bay o Yodo	o NO_x o CO o Yodo River Basin o Cultural Preservation	o NO_x o Photochem. Smog o Coastal Pollution Redtide (Plankton bloom)	o N + Ph in Lake Biwa → Eutrophication o Sewage System (3.8% only in 1977) o Conservation of Green
GOALS, OBJECTIVES, TARGETS	o Achieve National Standards by 1981 o 90% Sewage until 1981; 100%, 1985 o N, Ph, Phenol Standards (Osaka) Until 1981 o 72% Reduction of BOD until 1981	o Achieve National Standards by 1981 o Improve Sewage System	o Achieve National Standards by 1981	o Cover 90% Sewage until 1990 o National Standards until 1981 o 1 ppm Quality Standard for N + Ph until 1981 o Sites + Number of Parks
INSTRUMENTS TOOLS	o TEC for SO_2 o Fuel Changes o Monitoring Air (45 Stations) o Control Traffic Frequency o Public Participation (BIG) o Env. Impact Assessment (EIS)	o Land Use Plans (8 Zones) o Mesh Analysis Monitoring o Restrict Outside Visitors (Automobile) o TEC for SO_2 (Diff. from National) o Pollution Area Designation	o Shift towards TEC (NO_x) o Diff. Air Pollution Standards in 9 Districts + BOD o Extensive Monitoring (LARS) o Public Participation Schemes	o Sewage System o Control Pollution Increase o TEC for N + Ph o Public Mode Against Chemical Use (Ph) o Land Use Planning
EXAMPLE PROJECTS	o Sewage Construction o Project "Green" o New Blue Sky Project for NO_x	o 10-year Water Quality Project o 7-year Air Quality Project o Mesh Project Monitoring	o TEC Models o District Plans	o Lake Biwa Comprehensive Development Project (with Osaka and Hyogo)

new instruments for public participation. In addition, the new Kansai international airport presents an opportunity to develop schemes for environmental impact assessment, a tool presently not in wide use in Japan.

There are certain shifts from concentration emission control to total amount emission control (TEC). These changes have been motivated to avoid dilution strategies by which industries could achieve emission concentration standards, but still emit the same total amount of pollutants. The Hyogo prefectural environmental pollution center has advances with NO_x total amount emission control and works presently on a model for the allocation of the total amount limits to different sources. Some more drastic environmental control mechanisms are conceived by Kyoto and Shiga prefectures. Kyoto has implemented a public relations campaign to reduce the influx of automobiles from other prefectures. Shiga actually considers, as an ultimate tool for pollution control, direct control of population influx.

There is one most marked difference between the Osaka, Kyoto, and Hyogo environmental plans and the Shiga plan. While the first three are strictly for the prefectures and hardly mention extra-prefectural issues, the Shiga plan for Lake Biwa comprehensive development is, in fact, supported and elaborated in cooperation with Osaka and Hyogo prefectures. This cooperation was motivated mainly by the strong interest of these two prefectures in good water quality and high water quantity from the Yodo River basin which originates with Lake Biwa. The reasons why Kyoto prefecture does not participate in the Lake Biwa planning are somewhat unclear. One reason may be that the Kyoto prefecture itself has to make strong efforts to improve the water quality from the Yodo River basin, thus taking its own share in improving the total system.

When looking at the vertical integration of environmental planning, we can refer back to the separation of planning and coordinating functions of the environment agency vis-a-vis the prefectures and cities. Concrete environmental planning is thus done in the prefectures and designated pollution control areas under the guidance and coordination of the Environment Agency. Horizontal integration of planning is, however, still very limited. There is no Kinki environmental plan, and only the Lake Biwa comprehensive development plan is a joint plan of several prefectures. This lack of integrated planning appears somewhat surprising, considering the need for integrated pollution transfer planning, particularly for the Yodo River basin.

3.5 Budgeting for Environmental Projects

Budgeting mechanisms are the most powerful tools for the design and realization of environmental plans; in addition, they support or limit integrative approaches. Our study has therefore examined in detail the budgeting mechanisms for

environmental pollution control. Fundamentally the finding was the same as for comprehensive prefectural development plans: budgeting is, in general, centralized and project-oriented.

Figures 13 and 14 give two examples of the budget flows to pollution control projects in the Kinki region [8,12]. The first is for a sewage system in Osaka. Here the national government supports 40% of the project, and prefectures and city of Osaka share the remaining 60%. Users' fees and industrial contributions add to these funds the non-governmental share. Such project-oriented budgets with a large share controlled by the national government tend to augment the actual plan implementation and limit the flexibility of prefectures. In addition, they tend to work against horizontal integration by favoring strong centralization, since no interprefectural money flows are allowed. An exemption is the sewage project for the Shiga prefecture as part of the Lake Biwa comprehensive development plan. Although the share of the central government in this project is 66%, and thus central control is even larger, the remaining moneys are shared by three prefectures and cities. If these cases are typical - and our discussions with the prefectural officers indicate that they are - the budgeting process actually interferes with integrated planning and implementation across prefectural boundaries.

3.6 Environmental Research and Modeling

The last aspect of Kinki environmental management that we considered were attempts for developing models for environmental management. Most other research activities are done on a national level (e.g., research on health effects, ecological research). Modeling pollution dispersion, pollution transfer and modeling allocation of emissions and amounts to sources is done by the local environmental pollution control centers. Monitoring is also a city or prefectural task. Particularly in the Hyogo and Osaka environmental control sections, sophisticated attempts are made to model air and water pollution dispersion, with particular emphasis on air pollution dispersion. Dispersion models have two main purposes:

1. to predict environmental conditions and to initiate in advance control action (e.g., fuel changes, stopping of industrial operations, alerts, alarms, etc.);

2. to determine optimal allocations of emission and total amount control over industries and sources.

Figure 15 gives a particularly impressive examples of such modeling attempts by the Hyogo prefecture [11,13].

Two observations having to do with the regional aspect of modeling which this paper focusses on can be made. First, inter-pollution transfer is still poorly modeled. Osaka, for example, considers pollution inputs from other prefectures only

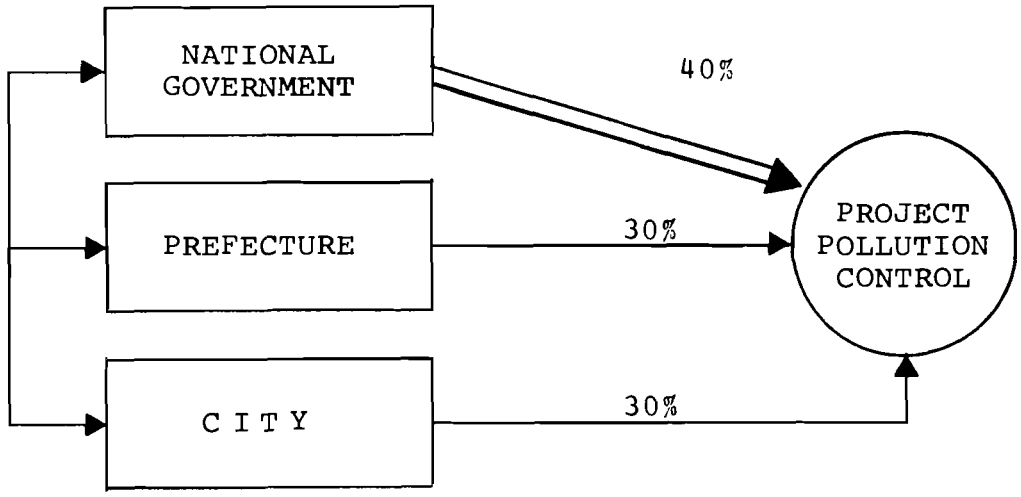


Figure 13 BUDGET FLOWS FOR ENVIRONMENTAL POLLUTION CONTROLS (EXAMPLE : OSAKA SEWAGE)

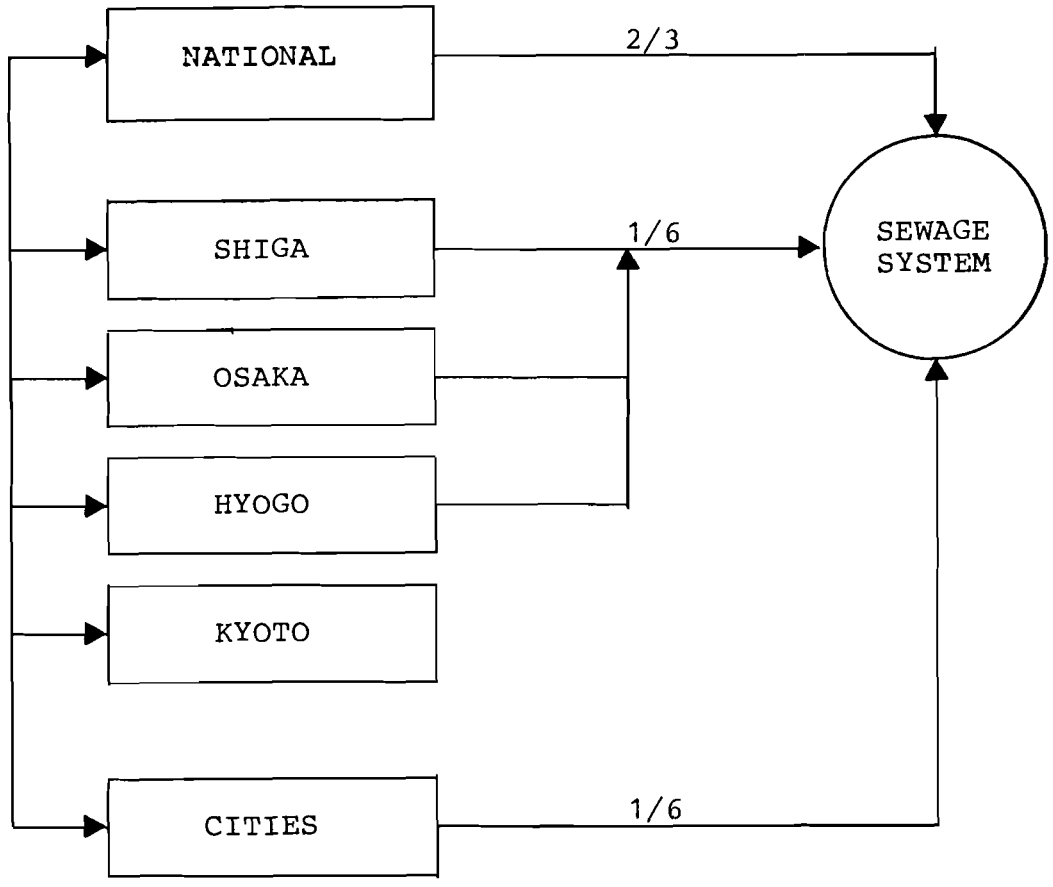
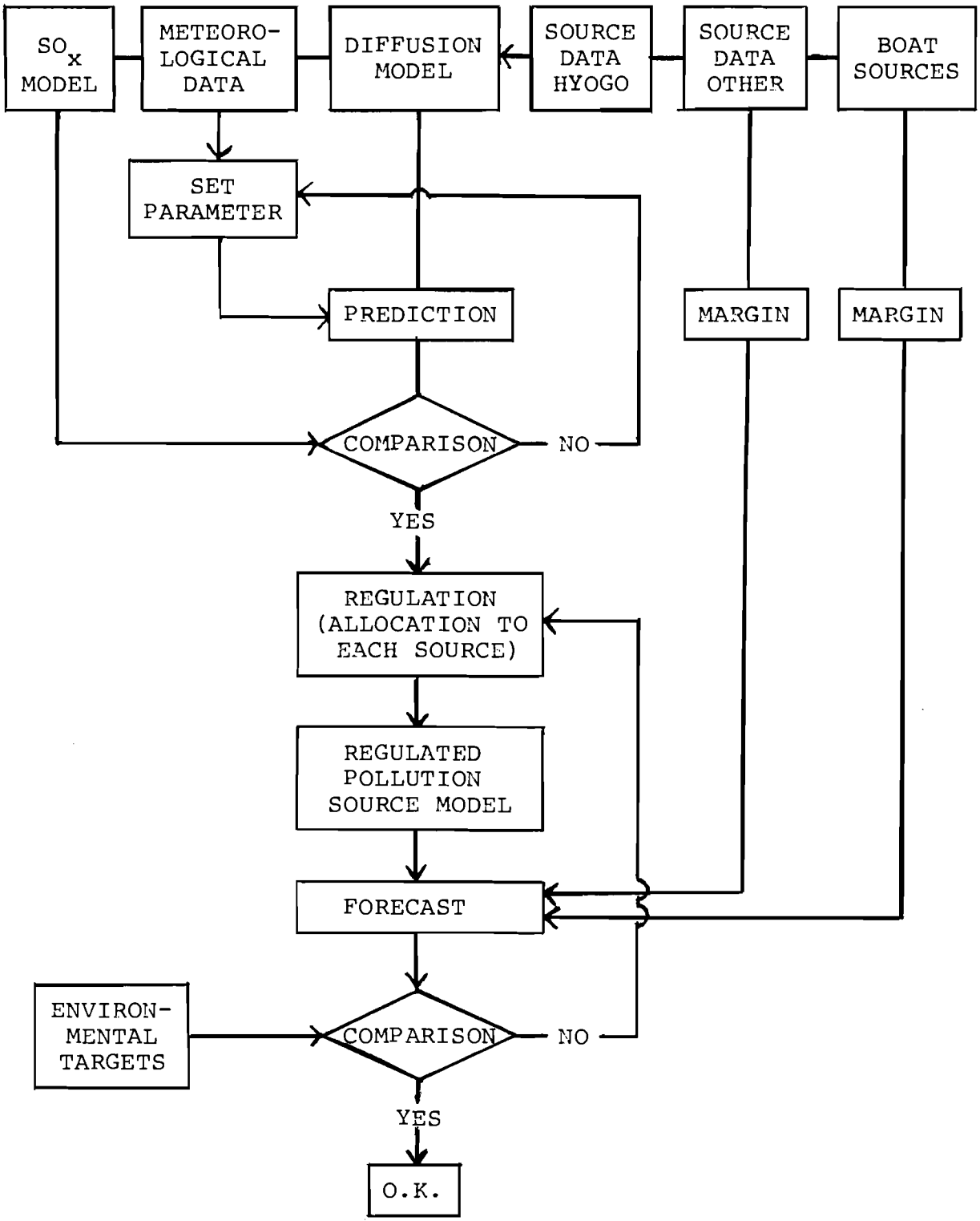


Figure 14 BUDGET FOR SHIGA SEWAGE SYSTEM (MAIN TRUNK LINE)

Figure 15 TOTAL AMOUNT EMISSION CONTROL MODEL (SO_x) - HYOGO



through fixed parameters. No direct model interlink to, say, Hyogo exists. Thus, there is not much horizontal integration of such models. Another problem lies in the use of dispersion models for regulation. Somewhere in the modeling process regulation equations have to do the actual allocation job. This task is still done in a rather crude way and lacks explicit formulations of the burdens and costs put onto several pollutants. The lack of pollution transfer models also augments regulations based on models to the special prefecture which may be sub-optimizing the environmental system. The second observation is that in the most urgent area of pollution transfer modeling for the Kinki region, the Yodo River basin case, there are, as yet, only a few modeling attempts.

3.7 Conclusions

Table 14 summarizes the main observations of this study. The main need for Kinki environmental management at the moment is the need for vertical and horizontal integration of organization, planning, budgeting and modeling. While vertical integration seems to exist with a clear separation of functions, a multiple interrelation of organizations, and a strong central budget control, horizontal integration lags behind on several counts:

1. there exists no Kinki environmental management body;
2. there exists no Kinki environmental plan;
3. the budeting mechanism prohibits integration among prefectures and within plans;
4. the modeling attempts for pollution transfer are not yet sufficiently developed.

Improvement in these four areas can certainly be made. Such improvements based on the creation of a Kinki environmental management body are the main recommendations of this research.

Table 14 OBSERVATIONS: INTEGRATION IN ENVIRONMENTAL MANAGEMENT

	Vertical Integration	Horizontal Integration
Organization	o EA-Prefectural Pollution Control Center in Close Contact o Approval Schemes	o No Kinki Environmental Management Body o Several Inter-Prefectural Councils and Committees
Planning	o Goals and Targets on National Level - Prefectural Implementation and Control Schemes o Consistency through Approval Schemes	o No Kinki Environmental Plan (Exemption: Lake Biwa) o Planning Necessary for Pollution Transfer Control
Budgeting	o Obstacle to Integration: Individual Project Oriented o Strong Central Control	o No Joint Budgets (Exemption: Lake Biwa) o No Inter-Prefectural Money Transfers
Modeling	o EQS - ES- TEC Models Exist o Problems with Regulation Equations, K Values	o No Good Pollution Transfer Models as of yet

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[3] White paper on Pollution Problems, Hyogo Prefecture, 1976, (published 1977).

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[5] Management of the Yodo River Basin, Kinki Bureau of the Ministry of Construction, 1976.

[6] Quality of the Environment in Japan, Environment Agency, 1977.

[7] White Paper on Pollution Problems, Kyoto City, 1976, (published in 1977).

[8] BIG Plan (Blue sky, Industrial waste control, Green land), Osaka Prefecture, 1973.

[9] Pollution Control Plan, Kyoto Prefecture, 1976.

[10] Pollution Control Plan, Hyogo Prefecture, 1975.

[11] White Paper on Environmental Problems, Shiga Prefecture, 1976, (published in 1977).

[12] Interview with official of the Shiga Prefecture, October 1977.

[13] Interview with officials of the Hyogo Prefecture, October 1977.

4. PROBLEMS IN APPLICATIONS OF FORMALIZED PLANNING TECHNIQUES AND MODELS

4.1 Relation of Models to Planning

The problems referred to in this chapter are of a twofold nature. First, there is the need for techniques and models for the solution of currently important regiona socio-economic problems. The second category of problems are the organizational and technical needs in prefectural modeling activities. A short characteristic of these problems is given and, on the basis of their comparison with past and current modeling activities within the prefectural authorities, some observations are made on resulting organizational and research needs. These are, in turn, compared with the Kinki IRD Modeling Project activities to determine which problems are covered by the work done within the group led by Y. Sawaragi.

In order to be able to assess the appropriateness and value of models and formalized analytical techniques one has to place them adequately in planning and management processes. Thus, it is required that these processes be represented in such a way that the place and role of models could be easily recognized and analyzed. In the present study a simple decision-procedure-loop representation of the planning and management processes was utilized, as shown in Figure 16 (see also [1,2]). The functions and stages of this decision procedure are the objects of modeling.

The models or analytical techniques developed within the planning and management system perform or emphasize such functions as:

- representation of the problem, i.e.,
  - of the socio-economic object system and changes in it, and
  - of the actors' values and changes in them
- generation of policy alternatives in terms of options in the instruments' use, and also
- evaluation of possible development paths in terms of their products and impacts,
- choice among policy alternatives (optimization).

Besides basic functions forming the loop there is also the question of consecutive policy formation stages through which the loop has to go iteratively:

- recognition and structuring the problems,

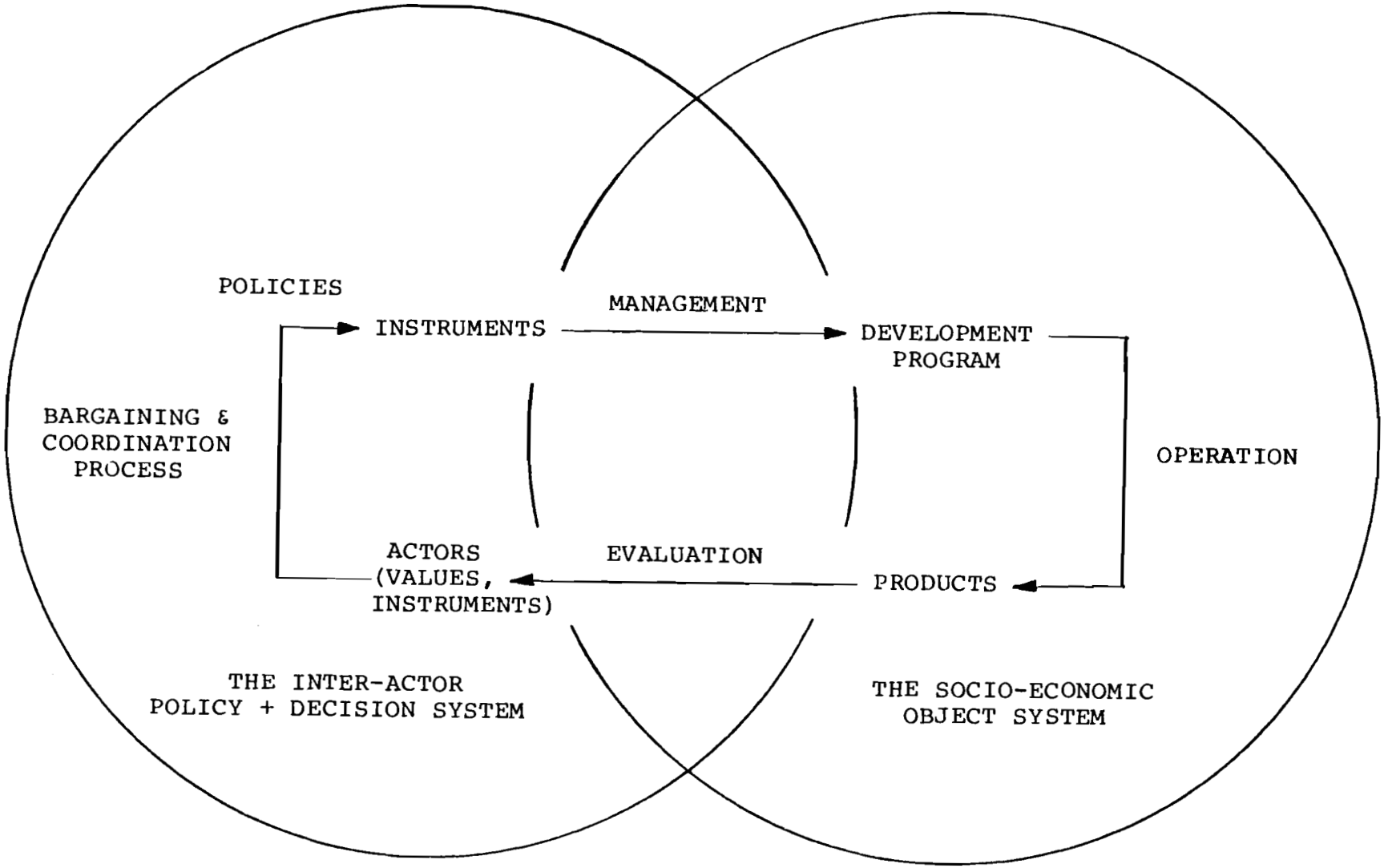

Figure 16 THE BASIC DECISION PROCEDURE LOOP

- studies of possible structural long-term system changes,
- assessment of the long-range strategic options,
- adoption of workable policies for dealing with identified problems, and
- impact assessment, screening, evaluation and specification of projects.

A separation of actors in planning and management may be done in various ways. For this study a very simplified breakdown was utilized:

Actor Type	Value Type
Central government*	National economy & stable society
Central business	Sectorial economies
Prefectural & local authorities*	Autonomy & human environment
Local business	Regional growth
Residents	Broad consumption: commodities & environment.

Only modeling activities of those actors marked with asterisks were looked at in detail.

In view of the above decision procedure in which the models are embedded, the consistency requirement can be expressed in terms of comprehensiveness and integration [1]. In order to be consistent, the model system has to be comprehensive and integrated with respect to:

- functions and stages - all functions and stages should be included; communication and/or connections between them established, both forward (i.e., between individual functions and stages) and across (within individual functions, e.g., among various values and/or products) - see [2];
- actor structure - the values and policies for main actor groupings have to be represented and communicated;
- problem structure - ensuring of a correct orientation and content of the problem-solving procedure;
- problem-solution consistency - model-generated policies must be consistent with the problem structure (e.g.,

optimization results must correspond to real implementation capacities in terms of instruments operated) so that no mutually contradicting partial solutions are obtained.

Figure 17 shows a somewhat simplistic framework for placing the model system functions. Two types of models are implied by the structure presented:

- the element models representing entities shown in cases, and
- the connecting models for ensuring integration (e.g., cross-impact analysis models).

The structure is meant for the whole of the actor system and is mainly oriented at regional level. National level considerations would enter the evaluation and impact generation functions, while virtually at all functions and stages the sub-regional (prefectural) breakdown has to be kept explicit. The latter is, of course, conditioned by the existing institutional situation.

The actual institutional and modeling situation stipulates that the full scope of modeling has to be undertaken within the two main actor types: central (primarily National Land Agency, and also EPA, MITI and ministries of transportation and construction) and local governments.

4.2 Actors: Problems and Model Development and Use

Central Government

Table 15 presents problems of regional character as perceived by agencies and ministries within the central government. These problems, taken literally from [3,4,5, and 6], were stated in the contexts referring in an obvious way also to Kinki. They are stated in a very general form, however, and can only become region-specific when applied to different regional conditions. It should be emphasized that the regional policies of the national government were to a large degree of an interventionist nature, and not very different for central and for local authorities. Therefore similar types of policy actions in a prefecture can be taken side-by-side with central and local authorities (new industrialization areas etc.).

This poses the question of rational multi-level organization of regional policy elaboration and implementation [7]. Such a question becomes especially acute when one looks into the actual effectiveness and efficiency of centrally-fostered investment policies (see [2] and [8c] for an assessment of

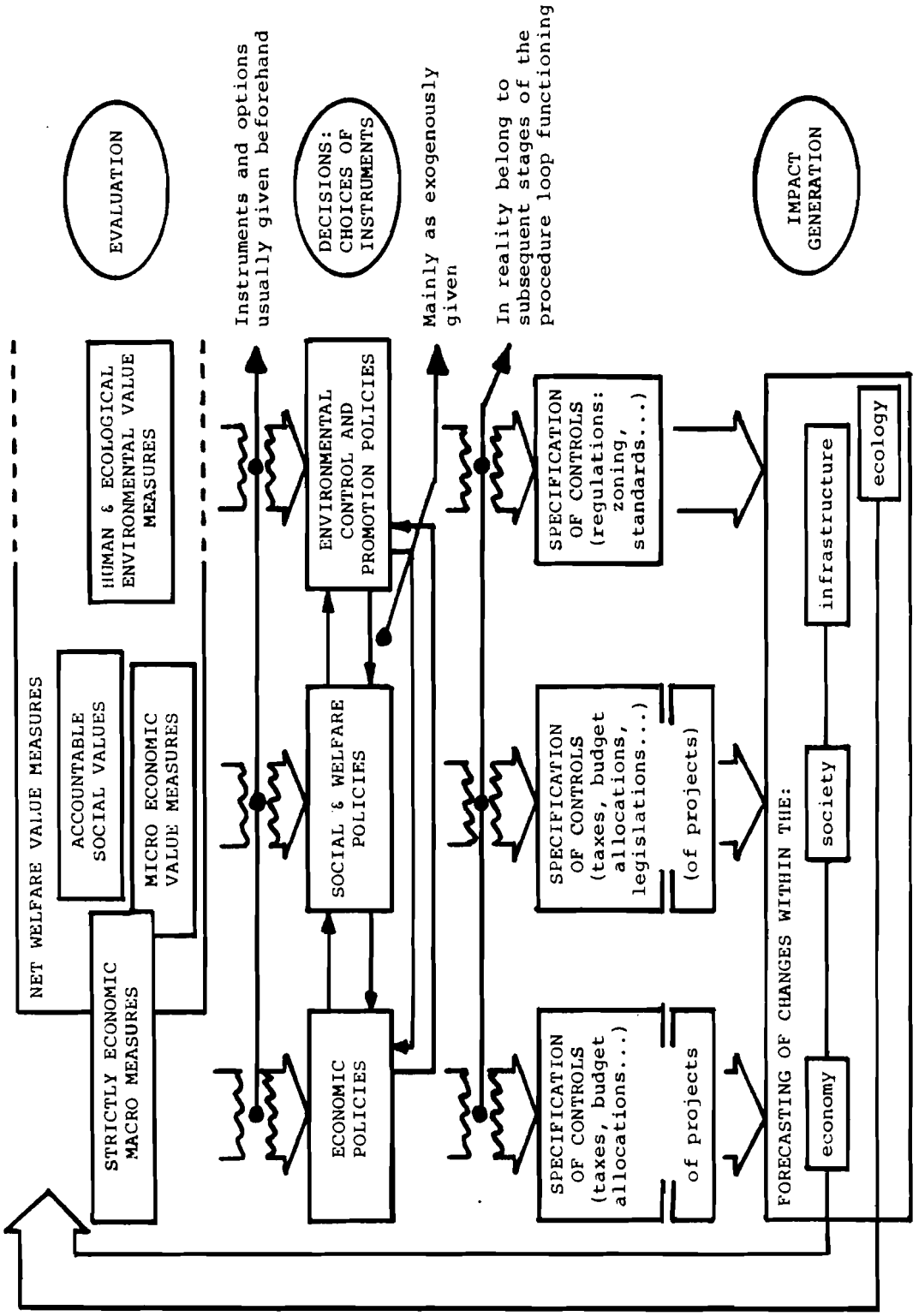

Figure 17 AN OUTLINE FOR MODEL SYSTEM FUNCTIONS

Table 15 CENTRAL GOVERNMENT'S PERCEPTION OF REGIONAL PROBLEMS

ACTORS	PROBLEMS:		MEASURES:
REGION-ORIENTED ACTORS	Overcrowding vs. Depopulation	Dearth of Housing Commuter Hardships Pollution	• Basic Development Plans • Zoning • Relocation • New Centers • Fiscal Measures (for Prefectures)
WELFARE + INFRASTRUCTURE-ORIENTED ACTORS	Urban Sprawl Scarcity of Resources Land Water Labor Force Energy & Materials		• Object-Oriented Plans • Projects (General Purpose) • Projects (Welfare) • Allocation concepts • Budget Allocation (Activities & Regions) • Infrastructural Projects
	External Economies & Diseconomies		
ECONOMIC & INDUSTRIAL POLICY ACTORS	Limitations to Market Mechanisms Restructuring		• Regulations (Environmental & Energy Consumption Standards) • Taxation Policies, Subsidies, etc. • Factory Location Legislations

regional policies in Japan). As follows from [2] and [8c] not only did the growth-center and restructuring policies change the shape and push-pull influence of existing space economies little, but they often followed the pattern of economies, thus posing the question of consistency with explicitly stated broader goals.

A number of problems therefore arise which pertain to the use of models and other quantitative analytical techniques.

(1) Analysis of policy consistency regarding value measurements, potential structural (long-term) system changes, resulting problem structure, specification of goals and instrumental capacities.

On the evaluation side two important streams of work which have already made some impact should be mentioned for Japan. First is the Net National Welfare (NNW) indicator studies [9] aiming at complementing, if not substituting, the GNP-type indices in analyses of development paths. Such NNW indicator would certainly put more stress on local and environmental values. Another is a somewhat broader but also less structured social indicator analysis [10].

(2) Assessment of actual influences of various types of policy instruments (budget allocations, taxation, subsidies, mixed crediting companies and other fiscal and monetary instruments with regard to private business).

Some good examples of modelling studies oriented, however, almost uniquely to transportation are provided by the BALAMO model [11] and the two models presented at the Shinkansen conference at IIASA, June 1977 [12,13].

(3) Analysis of interregional and metropolitan-rural relations; assessment of spatial changes, internal forces driving them and capacity to control them (see 2 above).

A number of interregional models have been developed (see a survey until 1973 in [14]) either for specific regions or for the whole of Japan (some of them in connection with EPA's interregional studies) which could be used for such purpose. Much less was done to analyze metropolitan areas relations with other parts of the economy and society, especially as far as spatial changes go.

(4) Analysis of spatial economies and diseconomies in a broad sense - from the viewpoint of administration, economy and residents. Such analysis could give information on the strength of internal forces needed in (3) above. (It is possible that for such an analysis a sort of micro-level assessment of spatial functions in conditions of varying settlement environments could be necessary.)

(5) Information on economies and diseconomies, if treated activity-demandwise, along with assessment of inter-regional relations and international trade projections should give an adequate basis for regional specialization considerations. These could be coupled with appropriate inducement policy studies aiming at definition of policies serving to restructure the activities in some regions.

Very little is being done within this area in a normative framework. Some studies were conducted within MITI, subcontracted to some research institutes dealing with location analysis, but no definite information on this subject could be obtained.

(6) A somewhat parallel problem to (1) - (5) should be looked at, namely that of policy formation and implementation and system design from the multi-level system organization point of view. This of course requires procedures of plan definition on one hand and division of responsibilities and powers on the other - namely between central and local governments. The lack of specific regional authorities makes this problem especially important.

Some remarks on the subject can be found in [7], but in general there is little available in this area.

Thus, some of the basic problems which the main central governmental actors face when choosing regional policies do not find, as yet, modeling application counterparts. Some potentially usable models developed within the institutional planning and management system are shown in Table 16. According to [14] which surveys econometric models in Japan, until 1973, nine models existed on the national levels, six on the regional level, 20 for multi-prefectural units, 25 for prefectural units, and 16 for smaller (city and urban areas) units. Of these 14 related in one way or another to the Kinki region.

Prefectures and Cities of the Kinki Region

Consideration of the level of prefectures means switching to sub-regional level with omission of the regional one. In order to make the missing level more visible and to show how it can enter policy making and decisions of prefectural and municipal bodies, the problems have been classified into the groups:

I General : Problems which to some degree concern a larger number of prefectures in Japan than just those belonging to Kinki;

II Common : Problems which are to some degree common for some or all of the Kinki subdivisions, so that they promote regional considerations; and

Table 16 REGIONAL BREAKDOWN IN SOME POTENTIALLY USEFUL NATIONAL LEVEL MODELS

AUTHOR/SPONSOR	NUMBER OF REGIONS
Japan Center for Area Development Research Model (Japan Center for Regional Development, 1965)	9
Models of: T. Tsuji (I) (1965)	5
T. Tsuji (II) (1966)	11
Economic Planning Agency Pilot Model (I) (EPA, 1967)	9
Economic Planning Agency Pilot Model (II) (EPA, 1967)	46 : Prefectures
Economic Planning Agency Master Model (EPA, 1967)	9
Master Model for Capital Metropolitan Region (Christian University, 1967)	4
Kinki Multi-Prefectural Region Model (Christian University/Kinki Redevelopment Agency, 1968)	4
Research Center for Electric Power Model (Research Center for Electric Power, 1973)	4

Source: Fukuchi, T. (Ed.), Review of Regional Economic Models in Japan, in Regional Economics, Yukikaku Pub., Tokyo, 1974.

III Specific : Problems which concern primarily one of the subdivisions. In this category were also located special interests of the subdivisions.

The above categories of problems, corresponding measures and models are presented in Tables 17, 18, and 19a-d. The items in parenthesis are either only potentially entering the given case or they are not fully applicable there. According to [14] several models were developed for the Kinki region prefectures and cities in the past, fitting primarily under urban change and planning models in Table 18. These models did not enter Table 18 because of a lack of precise information. An overall view of the modeling activities to judge the coverage of problem areas is given in Table 20. It is evident from this table that while there is a fairly good coverage for common and some specific problems very little is done in the "general" category. Some of the general problems are, in fact, national ones so that it could be expected that the appropriate models be done within the central planning bodies. They would, however, be used for formation of national policies towards regions, which, as previously pointed out do not necessarily have to have the same character as the regionally-generated ones.

On the basis of Tables 17-20 a summary overview of model applications pertaining to various stages in decision procedure can be made as given in Table 21. From this overview a general approach to model development and utilization used within the prefectures of the Kinki region can be reconstructed (Table 22). Such a fully reconstructed series of models does adequately enough account for consecutive iterations of the decision procedure loop. Once such a series gets established in one of the prefectural government's planning departments it will be of great importance to ensure appropriate communication among models, for example, to ensure a relation of problem structuring applications to long-term dynamic structural models on the one hand and to value identification and shift models on the other hand. Another essential connection would be the one that relates project specification, assessment and choice to value models. In general, smooth transition from one to another should be assured. There is also the problem of functions at each stage. The choice or optimization function has only been to a modest degree provided by the PIAS + CARPS system, i.e., for a rather short time horizon. The social indicator studies do not, as yet provide an operational basis for evaluation of plans and projects.

4.3 Kinki Region Modeling - Some Observations

As mentioned already, there is a relatively high degree of comprehensiveness with regard to internal regional problems and (potentially) with regard to consecutive stages of decision procedure functions. There is, perhaps, more to be done in modeling of agglomeration economies and diseconomies and their spatial changes over time in order to adequately phase the spatial policies.

Table 17 GENERAL PROBLEMS

PROBLEMS		1 AUTONOMY VS. FINANCIAL DEPENDENCE	2 IMPROVEMENTS IN SOCIAL, INFRASTRUCTURAL & ECOLOGICAL ENVIRONMENTS	3 RELOCATION & RESTRUCTURING OF ACTIVITIES	4 EQUALIZATION OF INCOME
MEASURES TO COPE WITH		(Fostering of internal growth & improvement, creation of attraction & gravity center) (Financial soundness argumentation)	Welfare systems, infrastructural, equalizing investments Preservation & activation in the societal system Conservation & monitoring of the environment	New centers & industrial parks Consolidation projects	Redistribution of income Spread of growth, fostering & preservation of local centers
MODELING:	WITHIN KINKI PREFECTURES	(Osaka prefecture econometric financial model)	Social indicator studies (Osaka, Hyogo) (SD models in Shiga, Osaka & Hyogo) (CARPS + PIAS - Hyogo - as screen. device)	CARPS + PIAS: Hyogo	(Econometric Models?)
	WITHIN KINKI IRDMP		Cultural & environmental assets evaluation techniques Equalization of social utilities Simulation of the environmental impacts Evaluation methods for environmental purpos.	IRDPM *(for general specialization studies) OASIS	(Equalization of societal utilities: in fact not directly income-oriented)
	OTHER POTENTIAL, COMMENTS	(Multilevel structuration models) (Interregional optional growth promotion & centering models) (Financial planning & management applications)	(Societal values structuration models) (Cross-impact analysis)	(Technological & demand projections, price & cost studies, specialization & optimization models)	(Spatial differentiation & specialization models)

* Integrated Regional Development Programming Model

Table 18 COMMON PROBLEMS

PROBLEMS		5 (CREATION OF REGIONAL FUNCTIONAL SYSTEM)	6 WATER SUPPLY	7 AIR POLLUTION	8 URBANIZATION & LAND USE
MEASURES TO COPE WITH		(Enhancement of consolidation, & higher functions' attractiveness)	Lake Biwa Plan, accompanying infrastructural projects	Standards Local monitoring & control systems	New Towns Consolidation Land Use Controls
MODELING:	WITHIN KINKI PREFECTURES	(Osaka prefecture econometric model) (PIAS + CARPS)	Lake Biwa & River Yodo models (quality or quantity)	Air pollution dispersion models (Kyoto, Osaka, Hyogo), monitoring applications	(Standard land use physical planning traditional techniques)
	WITHIN KINKI IRDMP	IRDPM OASIS	A number of models from LP ones to conflict, multiattribute & interactive optimization	(Works of the IBM Japan group)	Two land use models
	OTHER POTENTIAL, COMMENTS	(Interregional specialization & attractiveness models)	(The area fairly well covered)	(Pollution share models)	(Agglomeration economies & diseconomies, urbanization dynamics models)

Table 19a SPECIFIC PROBLEMS: OSAKA PREFECTURE

PROBLEMS	①②③⑤⑥⑦⑧	KANSAI INTERNATIONAL AIRPORT	SETO INLAND SEA ECOSYSTEM
MEASURES	(For a detailed list see Chapter 2) Big Plan Turn from new towns to reconstruction Social Indicator Studies	Assessment Studies (impact mitigation/ utilization)	Assessment Studies (regulations, potential impacts)
MODELING	Long term SD model (1976-90 PCDP) Medium (& long?) term econometric, I/O, financial model Partial applications (Tables 17 & 18)	Preparations to use an econo-metric (I/O?) impact genera-tion model.	Preparations to use some eco-logical & then also economic impact models.

Table 19b SPECIFIC PROBLEMS: HYOGO PREFECTURE

PROBLEMS	①②③④⑤⑥⑦⑧	SETO INLAND SEA ECOSYSTEM
MEASURES	(For a detailed list see Chapter 2) New town trunkway consolida-tion, total emission control Public participation & social indicator studies	Assessment Studies (regulations, potential impacts)
MODELING	Long-term SD model (IBM) PIAS + CARPS for project-oriented applications (IBM) Partial applications (Tables 17 & 18)	Same as for Osaka prefecture?

Table 19c SPECIFIC PROBLEMS: KYOTO PREFECTURE

PROBLEMS	② ③ ④ ⑥ ⑦ ⑧	NATIONAL CULTURAL HERITAGE
MEASURES	(For a detailed list see Chapter 2). Industrial zones (complexes) Concentration, consolidation, Environmental buffer zones Sewage & drainage	(Preservation)
MODELING	? Partial (water) applications	

Table 19d SPECIFIC PROBLEMS: SHIGA PREFECTURE

PROBLEMS	② ④ ⑥	LAKE BIWA ECOSYSTEM
MEASURES	(Detailed list in Chapter 2) Lake Biwa Plan Public Participation	Within the Lake Biwa Plan
MODELING	Long term SD model. Medium term econometric model from the Mitsubishi Research Institute.	(Lake Biwa System modeling)

Table 20 ACTUAL MODELS AND ANALYSES: PROBLEM-WISE

	GENERAL				COMMON				SPECIFIC			
	AUTO-NOMY	ENVIRON-MENT	RESTRUC-TURATION	INCOME EQUALIZ-ATION	REGIONAL GROWTH	WATER	AIR	URBANIZ-ATION	KANSAI AIRPORT	SETO SEA	HERI-TAGE	BIWA
INTER-PREFECTURAL						○						
PREFECTURAL	○				⊗	⊕	⊕	○	◌	◌		⊕

⊕ Models exist and are used.

○ Model(s) exist which could be used, although this could require some modifications and re-interpretations.

◌ Modeling research underway.

Table 21 ACTUAL MODEL AND ANALYSES: STAGE-WISE

STAGE/FUNCTION / PREFECTURE	PROBLEM STRUCTURATION	LONG TERM STRUCTURAL PERSPECTIVE	LONG/MEDIUM TERM FORECASTING & PLANNING	MEDIUM/SHORT TERM POLICIES	PROJECT ASSESSMENT & CHOICE	EVALUATION
HYOGO	(DEMATEL)	HYOGO DYNAMICS		PIAS + CARPS PROBLEM-ORIENTED APPLICATIONS		SOCIAL INDICATOR STUDIES
OSAKA		OSAKA DYNAMICS	ECONOMETRIC MODELLING	PROBLEM-ORIENTED APPLICATIONS		SOCIAL INDICATOR STUDIES
KYOTO				PROBLEM-ORIENTED APPLICATIONS		
SHIGA		SHIGA DYNAMICS		SHIGA ECONOMETRICS (MITSUBISHI) LAKE BIWA MODELING		(PUBLIC PARTICIPATION)
GENERAL OR COORDINATION				KINKI BUREAU OF MOC WATER MODEL		

Table 22 RECONSTRUCTION OF AN APPROACH: SEQUENCE OF MODELLING AND ANALYSIS

PROBLEM STRUCTURATION	LONG TERM STRUCTURAL PERSPECTIVE	LONG/MEDIUM TERM FORECASTING & PLANNING	MEDIUM/SHORT TERM POLICIES	PROJECT IMPACT ASSESSMENT & CHOICE	EVALUATION
DEMATEL	SYSTEM DYNAMICS		GENERAL ECONOMETRIC MODELS SPECIFIC SECTORAL MODELS	PIAS + CARPS (Forecasting, Utilities, Interactiveness)	SOCIAL INDICATOR STUDIES

Another area in which more operationalization is needed involves value models that would allow explicit weighing of growth versus living environment values and of local versus overall development. The project impact assessment and choice applications might perhaps be also complemented with a deeper impact generation and propagation system (a sort of magnified PIAS + CARPS). A full spectrum of the object-system oriented models should ensure determination of how to create opportunities (shaping of the agglomeration economies) and how to use the ones offered (e.g., planning for the Kansai airport). To the existing set of models, integration should be brought so as to ensure (at least the internal) consistency. Such integration (stage and problem-wise) will make it possible to see whether the problems which face the prefectures can be aggregated to a regional specialization optimization or have to be treated in a satisfying or feasible solution search framework (trouble-shooting in individual, separate problem areas).

For a number of problem areas, however, such intra-prefectural integration is not sufficient to ensure consistency. If the joint problems shared by all Kinki prefectures are solved separately, no global optimum can be achieved. The minimal requirement would be to make provisions in models developed within individual prefectures for appropriate flow from and to other Kinki region prefectures, their reactions, policies, etc. In some areas it may be sensible to establish regional rather than prefectural resource limits or cost functions. It does not only concern environmental capacities, but also those capacities (or costs) which are related to economic location (agglomeration) situation.

On the basis of observations formulated throughout the chapter, a hypothetical model system structure can be reconstructed as shown in Figure 18. This illustration emphasizes the problem side and inter-actor communication side of the system, coupled with stage-wise deployment. Functional closing of the decision procedure loop at each stage and for each problem area is done separately. Actually a number of elements of such a conceived system already exist, either within the Kinki region prefectural governments or elaborated by the Kinki IRD Modelling Project. The summary overview of the coverage ensured by the latter according to function-and-problem structuration is given in Figure 19. As it can easily be seen the areas pointed out in Figure 18 could be covered quite soon, so that the main problem rests with assuring adequate linkages among models.

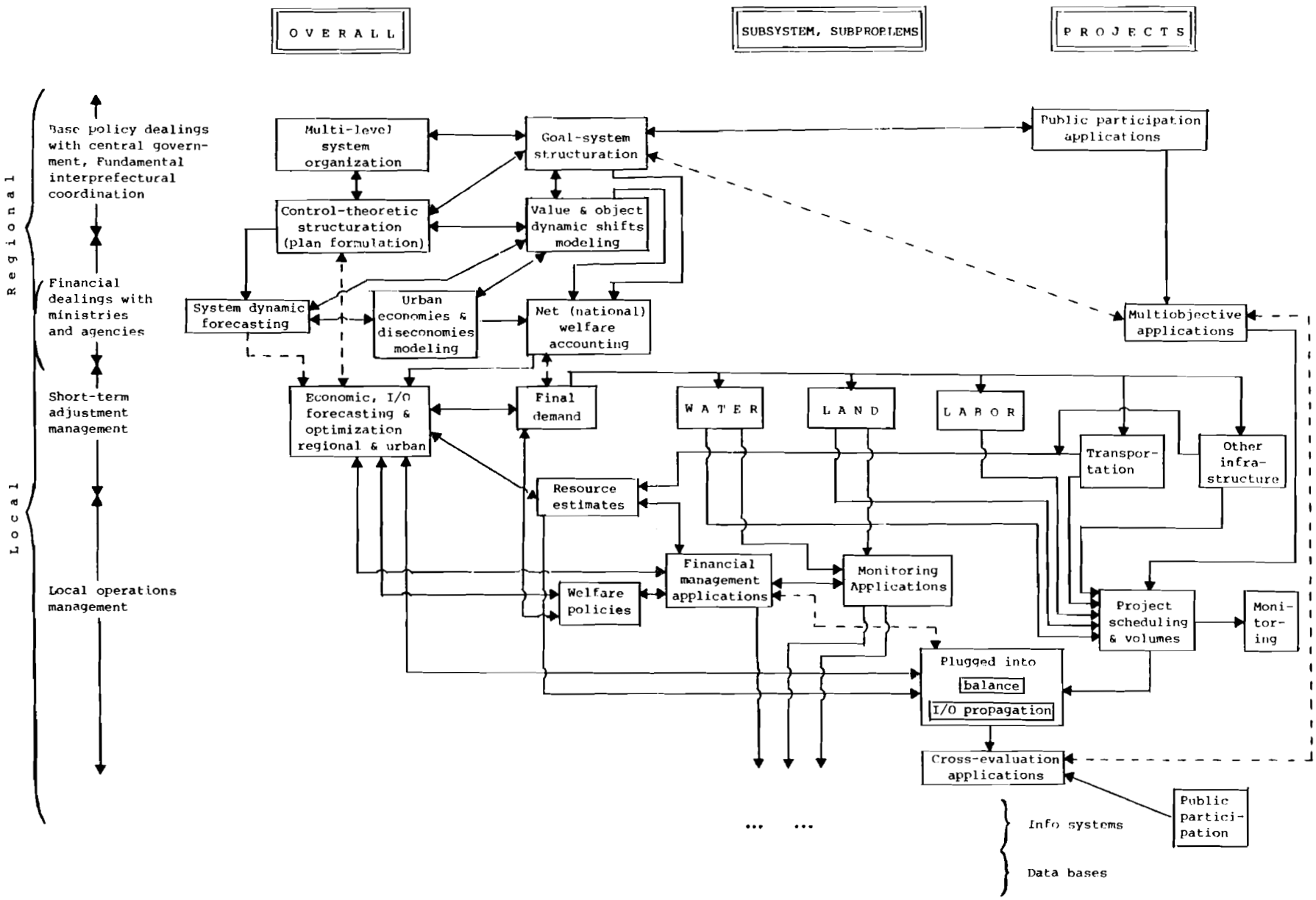

Figure 18 HYPOTHETICAL MODEL SYSTEM COMPOSITION AND STRUCTURE

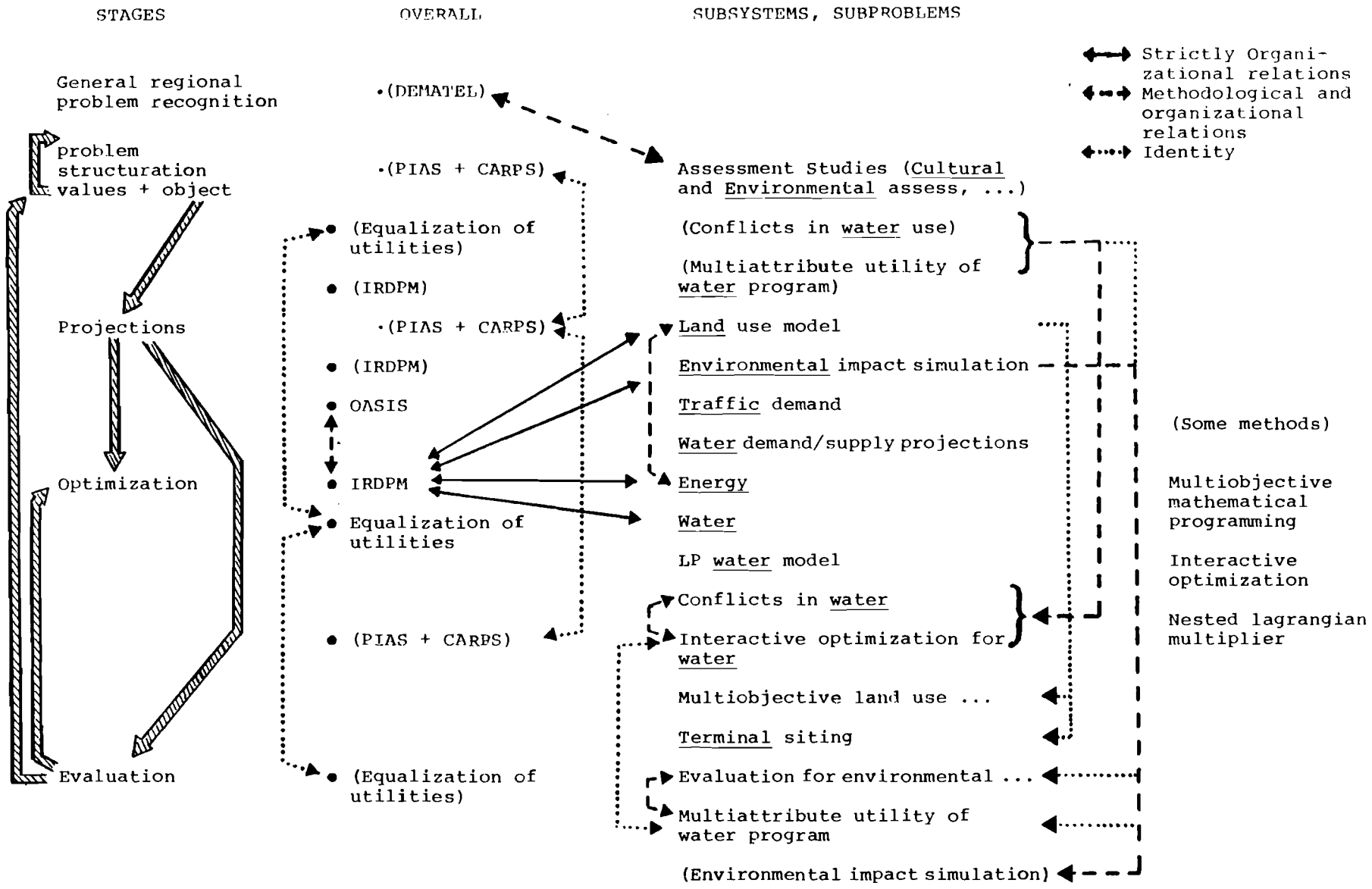

Figure 19 KINKI IRM MODELING PROJECT: STATUS FOR OCTOBER 1977

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5. CONCLUSIONS

In this paper, the problems of regional planning, modeling and environmental decision making in the Kinki region of Japan are discussed by using a structured policy analysis framework described in the introduction. The planning and management system, its organization, functions and outcomes are viewed through the set of actors on the basis of their values and instruments together with the attributes and interrelationship in the vertical and horizontal levels of the Kinki region.

The main need for the Kinki regional development system at the moment is to ensure more consistency and integration vertically and horizontally as to policy planning, budgeting and modeling issues. From the planning point of view we observed a difference between central and local governments, such as continuous socio-economic structure within each territory. Particularly in the environmental management system, while vertical integration and policy consistency seem to exist with a clear separation of functions, a multiple interrelation of organizations, and a strong central budget control, horizontal integration lags behind in the Kinki region as a whole.

There is a relatively high degree of comprehensiveness with regard to internal regional problems and consecutive stages of decision making procedure within the prefectures. In the modeling, however, there is more to be done to make provision in the models developed in the individual prefectures for appropriate flow from and to other prefectures together with the consideration of their reactions, policies, etc. Such horizontal integration enables the prefecture to see whether the problems coped with can be aggregated or have to be treated in a feasible solution search framework.

These observations should be considered along with an awareness that the Kinki prefectures have been playing a leading role in incorporating systems analytic tools into their policy formation and management as well as in strengthening autonomous capacity which will make it possible to bridge such gaps or inconsistencies.