IAI/UM SummerInstitute
Interdisciplinary Science in the Americas

Third IAI / UM Summer Institute on Interdisciplinary Global Change Science in the Americas

Lectures

INSTITUTIONAL ISSUES IN WATER MANAGEMENT

and

INSTITUTIONS AND CAPACITY BUILDING IN INTEGRATED WATER RESOURCES PLANNING AND MANAGEMENT

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23 - 24 July, 2001

ACKNOWLEDGMENT

These lectures follow in detail some parts of the valuable didactic publication:

A PROPOSED STRATEGY
TO ENCOURAGE AND FACILITATE
IMPROVED WATER RESOURCE MANAGEMENT
IN
LATIN AMERICA AND THE CARIBBEAN

by

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commisioned by the Environment Division, Social Programs And Sustainable Development Department,
Inter-American Development Bank

Washington, D.C.
March 1996

(partially available in internet: http://www.iadb.org/sds/doc/env%2DWLordE.rtf)

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STATE OF THE ART OF WATER RESOURCES MANAGEMENT

IMPROVING WATER RESOURCE MANAGEMENT IN LAC COUNTRIES

STATE OF THE ART OF WATER RESOURCES MANAGEMENT

THROUGHOUT THE HISTORY OF CIVILIZATION, BUT ESPECIALLY SINCE THE BEGINNING OF THE TWENTIETH CENTURY, THE DEVELOPMENT OF WATER RESOURCES HAS BEEN SEEN AS AN ENGINE FOR ECONOMIC DEVELOPMENT.

THE HEYDAY FOR WATER RESOURCES DEVELOPMENT OCCURRED IN THE DEVELOPED COUNTRIES IN THE FIRST HALF OF THE TWENTIETH CENTURY.

BY THE END OF THAT PERIOD MOST OF THE BEST SITES HAD BEEN DEVELOPED, DEVELOPMENT COSTS WERE RISING RAPIDLY, AND AWARENESS OF THE ENVIRONMENTAL IMPACTS OF DEVELOPMENT WAS SPREADING.

POLITICAL OPPOSITION TO WATER RESOURCES DEVELOPMENT PROJECTS INCREASED GREATLY

IRONICALLY, AT THIS SAME TIME TRANSFER OF WATER RESOURCE DEVELOPMENT TECHNOLOGY FROM THE DEVELOPED COUNTRIES TO THE LESS DEVELOPED COUNTRIES (LDC) BECAME A PROMINENT PART OF RESULTING INTERNATIONAL DEVELOPMENT AID PROGRAMS.

TECHNOLOGY TRANSFER OCCURRED INITIALLY WITH TOO LITTLE ATTENTION TO THE CULTURAL, ECONOMIC, AND POLITICAL DIFFERENCES BETWEEN THE DEVELOPED COUNTRIES AND THE LDC'S.

CONSEQUENTLY, WATER RESOURCE DEVELOPMENT PROJECTS, WHILE FACING THE SAME PROBLEMS OF HIGH COST AND ADVERSE ENVIRONMENTAL IMPACT SEEN EARLIER IN THE DEVELOPED COUNTRIES, ALSO ENCOUNTERED NEW AND DIFFERENT PROBLEMS WHICH RESULTED ALL TOO OFTEN IN POOR PERFORMANCE.

HISTORICALLY, WATER RESOURCES DEVELOPMENT HAS BEEN CONCERNED PRIMARILY WITH FACILITATING SINGLE PURPOSE WATER USES, SUCH AS IRRIGATION AND NAVIGATION.

BUT THE INCREASE IN KINDS OF USE, THE INCREASE IN NUMBERS OF USERS AND, ABOVE ALL, THE INCREASE IN SCALE AND TECHNOLOGICAL SOPHISTICATION OF WATER RESOURCES DEVELOPMENT, HAVE LED TO GREATER CONCERN OVER THE EFFICIENCY AND EQUITY OF SUCH DEVELOPMENT.

THE PERCEIVED LIMITATIONS OF STRUCTURAL WATER SUPPLY AUGMENTATION MEASURES, THE NEED FOR PROTECTING ENVIRONMENTAL QUALITY, AND THE GROWING RECOGNITION OF THE DESIRABILITY OF DEMAND MANAGEMENT ARE SOME OF THE TRENDS WHICH HAVE SUPPORTED THE CURRENT EMPHASIS UPON WATER RESOURCES MANAGEMENT, RATHER THAN WATER RESOURCES DEVELOPMENT, AND UPON THE GOAL OF SUSTAINABILITY.

ENDS – MEANS IN WATER RESOURCES MANGEMENT

ENDS: WHAT IS INTENDED TO BE ACOMPLISHED

MEANS: THE INSTRUMENTS USED TO ATTAIN THOSE ENDS

IN PRACTICE, A GREAT DEAL OF CONFUSION BETWEEN ENDS AND MEANS

HIGHER FARM INCOME, END OR MEAN?

END, IN THE ANALYSIS OF AN IRRIGATION PROJECT PROPOSAL

ONE OF THE SEVERAL MEANS TO ALLEVIATE POVERTY IN A NATIONAL POLICY ANALYSIS

ENDS - MEANS CONTINUUM

THE MOST SPECIFIC AND DETAILED INSTRUMENTS	SEVERAL DIFFERENT LEVELS OF MEASURES ENDS, IN SOMEANALYSES MEANS, IN OTHERS	THE MOST GENERAL AND ABSTRACT GOALS
➢BUILDING DAMS ➢ZONING FLOOD PLAINS ➢INSTALLING WELLS FOR POTABLE WATER SUPPLIES	SOLVING PROBLEMS: ▪SCARCITY ▪EXTERNALITY ▪OPEN ACCESS ▪PUBLIC GOODS " ENDS – IN – VIEW"	➢SUSTAINABILITY ➢POVERTY ALLEVIATION ➢ENVIRONMENTAL PROTECTION

OBJECTIVES AND CONSTRAINTS (1)

ENDS-IN-VIEW ARE CHOSEN AS OBJECTIVES TO GUIDE PLANNING AND DECISION MAKING

✓THEY ARE CONCRETE ENOUGH TO BE DEFINED CLEARLY

✓THEY ARE SPECIFIC ENOUGH TO BE ATTAINED THROUGH ONLY A LIMITED RANGE OF MEANS

THIS MAKES PLANNING AND DECISION MAKING A PRACTICAL AND PRACTICABLE ACTIVITY

ULTIMATE ENDS (GOALS) ARE NOT GOOD PLANNING OBJECTIVES

-SO GENERAL AND ABSTRACT AS TO BE DIFFICULT TO MEASURE

-THERE ARE MANY MEANS FOR PURSUING THEM

BUT,THEY NEED TO BE CONSIDERED NOT TO HAVE AN ANALYSIS TOO NARROW OR LACKING PERSPECTIVE. THEY CAN BE USED AS CONSTRAINTS IN THE SEARCH FOR OPTIONS

OBJECTIVES AND CONSTRAINTS (2)

WATER RESOURCES DEVELOPMENT PROJECTS

BENEFIT – COST RATIO GREATER THAN UNITY

IMPROVED ECONOMIC WELL – BEING FOR ALL

EXCELLENT CONSTRAINT ON THE SEARCH FOR OPTIONS

POOR PLANNING OBJECTIVE. INFINITELY MANY OPTIONS TO EXAMINE AND EVALUATE

ACTION SITUATIONS (1)

TO MOVE
FROM WATER RESOURCES DEVELOPMENT
TO WATER RESOURCES MANAGEMENT
REQUIRES

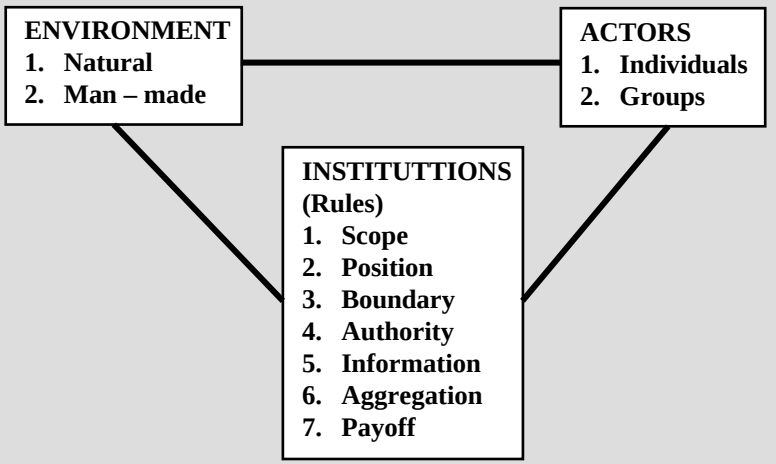
THE USE OF A BROAD ANALITYCAL OR CONCEPTUAL FRAMEWORK, WHICH INCLUDES:

- ***INSTITUTIONS***
- ***ENVIRONMENTAL AND SOCIAL VARIABLES***

AS WELL AS

- ***INFRAESTRUCTURE***
- ***HYDROLOGIC AND ECONOMIC VARIABLES***

THE CONCEPTUAL FRAMEWORK IS BASED UPON THE NOTION OF AN ACTION SITUATION



ACTION SITUATIONS (2)

ACTORS: **PERSONS OR HOMOGENEOUS GROUPS OF PERSONS WHICH AFFECT, OR ARE AFFECTED BY, WHAT OCCURS IN ACTION SITUATION**

IN WATER RESOURCES - RELATED SITUATIONS, THOSE WHO:

- **USE WATER**
- **ARE DIRECTLY AFFECTED BY THOSE USES**
- **REGULATE WATER USE**
- **MAKE WATER POLICIES AND LAWS**

THESE ACTORS BEHAVE IN WAYS WHICH ARE DETERMINED BY:

- **THEIR ENVIRONMENTS**
- **THE INSTITUTIONS OR RULES TO WHICH THEY ARE SUBJECT**
- **THEIR OWN BIOLOGICAL AND PSYCHOLOGiCAL (ORGANIZATIONAL IN THE CASE OF GROUPS) CHARACTERISTICS**

ACTION SITUATIONS (3)

ACTORS:

A MODEL OF THE ACTORS BEHAVIOR PROVIDES THE MEANS FOR PREDICTING HOW THEY WILL RESPOND TO CHANGES IN THE ENVIRONMENT OR IN INSTITUTIONS

EXAMPLE: **PREDICTING HOW PEOPLE WILL RESPOND TO WATER PRICING**

ACTION SITUATIONS (4)

ENVIRONMENT: IS A CATCH-ALL TERM FOR ALL THE IMPORTANT VARIABLES OTHER THAN ACTORS AND RULES

NATURAL ENVIRONMENT INCLUDES ALL ELEMENTS OF THE ATMOSPHERE, HYDROSPHERE, AND LITHOSPHERE, AND ALL OF THE FLORA AND FAUNA, WHICH MAY AFFECT, OR MAY BE AFFECTED BY, THE ACTIONS WHICH CAN BE TAKEN

MAN-MADE ENVIRONMENT INCLUDES PHYSICAL INFRASTRUCTURE AND ARTIFACTS

A MODEL OF THE ENVIRONMENT WILL NORMALLY ENCOMPASS THE ESSENTIAL HYDROLOGY OF THE GEOGRAPHIC REGION OF INTEREST AND WHATEVER ELEMENTS OF THE LITHOSPHERE, HYDROSPHERE, ATMOSPHERE, FLORA AND FAUNA DEPEND UPON OR AFFECT WATER RESOURCES

ACTION SITUATIONS (5)

INSTITUTIONS: THE RULES WHICH LIBERATE AND CONSTRAIN THE ACTORS

FORMALLY CODIFIED: LAWS AND REGULATIONS

INFORMAL AND UNDERSTOOD: CUSTOMS

ALL ARE CREATED AND CAN BE CHANGED BY HUMAN ACTION

INSTITUTIONAL INNOVATION: THE PROCESS OF CHANGING THESE RULES

AN INSTITUTIONAL MODEL EXPRESSES THE RELATIONSHIPS AMONG THESE RULES AND THE ACTORS AND ENVIRONMENTAL VARIABLES WHICH THEY MAY INFLUENCE

INSTITUTIONAL SET

TYPES OF RULES

- *SCOPE*
- *POSITION*
- *BOUNDARY*
- *AUTHORITY*
- *INFORMATION*
- *AGGREGATION*
- *PAYOFF*

ISSUES TO BE ADDRESSED

- *SCOPE*
- *PARTICIPATION*
- *POWERS*
- *INFORMATION*
- *DECISION MAKING*
- *BENEFITS AND COSTS*

SCOPE

SCOPE OF A POLICY, PROGRAM, OR PROJECT IS THE RANGE OF EFFECTS UPON HUMAN AND ENVIRONMENTAL SYSTEMS WHICH THAT POLICY, PROGRAM, OR PROJECT AFFECTS, EITHER NOW OR IN THE POTENTIAL FUTURE

SCOPE OF AN ACTIVITY: ALL OF THE SIGNIFICANT FORESEEABLE CONSEQUENCES OF CARRYING OUT THAT ACTIVITY

WATER RESOURCE MANAGEMENT

INCLUDES THE MANAGEMENT OF

PHYSICAL RESOURCES

HUMAN ACTIVITIES

SCOPE

DIRECT EFFECTS OF WRM ACTIVITIES

- PROVISION OF WATER FOR CONSUMPTIVE USES (MUNICIPAL AND INDUSTRIAL, IRRIGATION)

- MAINTENANCE OR ENHANCEMENT OF WATER FLOWS FOR NON-CONSUMPTIVE INSTREAM USES (HYDROELECTRIC POWER GENERATION, FISHERIES, NAVIGATION, RECREATION, PROTECTION OF AQUATIC AND RELATED ENVIRONMENTAL RESOURCES), AND THE MINIMIZATION OF NATURAL HAZARDS (FLOODING)

- PRESERVATION AND ENHANCEMENT OF WATER QUALITY (SIGNIFICANT PART OF BOTH USES)

SCOPE

INDIRECT EFFECTS OF WRM ACTIVITIES

- AMOUNT AND DISTRIBUTION OF MONETARY INCOME
- NON-MONETARY IMPLICATIONS FOR PEOPLES' LIVES (AMOUNT AND KINDS OF WORK THEY DO, HEALTH)
- IMPACTS UPON THE NATIONAL ECONOMY (PRODUCTION OF FOREIGN CURRENCY – GENERATING EXPORT GOODS AND SERVICES; DEMANDS FOR HEALTH-RELATED AND EDUCATIONAL SERVICES, FOR TRANSPORTATION AND OTHER INFRASTRUCTURE, AND THE PROVISION OF SUBSIDIES OR THE GENERATION OF REVENUE THROUGH USER CHARGES)

WATER RESOURCES MANAGEMENT ACTIVITIES HELP TO DETERMINE THE LONG-TERM SUSTAINABILITY OF THE SOCIO-ECONOMIC AND ENVIRONMENTAL SYSTEM OF THE RIVER BASIN AND OF THE NATION AS A WHOLE

PARTICIPATION (1)

AT ONE TIME THE PARTICIPANTS IN WATER RESOURCE MANAGEMENT WERE ONLY:

- WATER MANAGEMENT TECHNICIANS
- THEIR POLITICAL SUPERIORS
- PEOPLE DIRECTLY AFFECTED BY WHAT WERE THEN LARGELY STRUCTURAL WATER RESOURCE DEVELOPMENT ACTIVITIES

BROADENING OF SCOPE OF WATER RESOURCE MANAGEMENT:

DEMAND MANAGEMENT	AS WELL AS	**SUPPLY ENHANCEMENT**
RESOURCE PRESERVATION		**RESOURCE EXPLOITATION**

A FAR GREATER ARRAY OF PARTICIPANTS

IT IS ESSENTIAL THAT ALL MAJOR STAKEHOLDERS GROUPS BE REPRESENTED IN SOME WAY IN THE WATER RESOURCE MANAGEMENT DECISIONS WHICH WILL AFFECT THEM

PARTICIPATION (2)

THIS DOES NOT MEAN THAT THE INSTITUTIONS FOR MANAGING WATER RESOURCES MUST BE GENERAL-PURPOSE GOVERNMENTS

SUCH INSTITUTIONS MUST LIMIT THEM TO THEIR PRIMARY PURPOSES, AS INDICATED BY THE PRIMARY EFFECTS WHICH THEY PRODUCE

OTHERWISE, THEY WILL DUPLICATE AND COMPETE WITH OTHER RESOURCE MANAGEMENT INSTITUTIONS AND WITH GENERAL-PURPOSE GOVERNMENTS, A SURE ROUTE TO INSTITUTIONAL EXTINCTION

PARTICIPATION (3)

WATER RESOURCE MANAGEMENT INSTITUTIONS SHOULD PROVIDE FOR THE DIRECT PARTICIPATION OF STAKEHOLDER GROUPS WHICH EXPERIENCE THE DIRECT IMPACTS OF THEIR ACTIVITIES

SUCH PARTICIPATION CAN BE ORGANIZED THROUGH A VARIETY OF MEANS:

- ✓ **MARKET INSTITUTIONS (FOR DISTRIBUTING COSTS AND BENEFITS) THE MOST DECENTRALIZED**
- ✓ **POLITICAL INSTITUTIONS**

PARTICIPATION (4)

MARKET INSTITUTIONS PROVIDE EFFICIENT WAYS OF

- REGISTERING THE TRUE PREFERENCES OF PARTICIPANTS
- OF RATIONING SCARCE GOODS AND SERVICES
- DRAWING UPON ALL AVAILABLE INFORMATION

HOWEVER, THEY ARE PRACTICAL ONLY WHEN THE ABILITY TO ORGANIZE PARTICIPANTS INTO FUNCTIONING MARKETS EXISTS, OR CAN BE CREATED

THIS OCCURS ONLY WHEN PROPERTY RIGHTS IN WATER (INCLUDING THE RIGHT TO BUY AND SELL) ARE WELL-DEFINED

IT MAY NOT OCCUR EVEN THEN, IF HIGH TRANSACTION COSTS EXIST AND CANNOT BE REDUCED

MARKET INSTITUTIONS ARE DESIRABLE ONLY WHEN THE EXISTING DISTRIBUTION OF POWER TO COMMAND RESOURCES – AS REPRESENTED BY MONETARY INCOME AND WEALTH – ARE DISTRIBUTED IN PATTERNS WHICH REASONABLY APPROXIMATE A SOCIETY'S NORMS OF FAIRNESS AND EQUITY

PARTICIPATION (5)

POLITICAL INSTITUTIONS NORMALLY INCORPORATE

✓ CENTRALIZED MEANS, SUCH AS THE USE OF HIERARCHICALLY ORGANIZED GOVERNMENT BUREAUS AND AGENCIES FOR POLICY IMPLEMENTATION

COUPLED WITH

✓ DECENTRALIZED MEANS, SUCH AS THE USE OF REPRESENTATIVE GOVERNING BOARDS, ADVISORY COMMITTEES, AND SIMILAR INSTITUTIONS OF REPRESENTATIVE GOVERNMENT, FOR POLICY ADOPTION

PARTICIPATION (6)

THE PARTICIPATION OF STAKEHOLDER GROUPS WHICH EXPERIENCE THE SECONDARY EFFECTS IS USUALLY MORE DIFFICULT (OFTEN LITTLE MOTIVATION)

THE PARTICIPATION IS USUALLY ACHIEVED INDIRECTLY, THROUGH COORDINATING MECHANISMS AND THROUGH THE USE OF EXISTING GENERAL - PURPOSE GOVERNMENTS (COORDINATING COUNCILS WHERE REPRESENTATIVES OF SUBSTANTIVE AGENCIES SIT)

POWERS (1)

THE ORGANIZATIONS WHICH ARE ASSIGNED THE RESPONSIBILITIES FOR WATER RESOURCE MANAGEMENT MUST HAVE AUTHORITIES COMMENSURATE WITH THEIR RESPONSIBILITIES

THEY MAY BE ASSIGNED RESPONSIBILITIES FOR:

- WATER ALLOCATION
- WATER RESOURCE DEVELOPMENT
- WATER QUALITY CONTROL

IT IS PREFERABLE THAT ALL THREE BE ASSIGNED TO THE SAME ORGANIZATION

POWERS (2)

WATER ALLOCATION

WHERE THERE IS A SYSTEM OF TRANSFERABLE WATER RIGHTS, WATER RESOURCES MANAGEMENT ORGANIZATIONS MAY ADMINISTER THE SYSTEM

WHERE THERE IS AN ADMINISTRATIVE ALLOCATION, E.G., THROUGH THE ISSUANCE OF WATER USE PERMITS, THE RESPONSIBILITY AND AUTHORITY SHOULD BE LODGED IN THE WATER RESOURCE MANAGEMENT ORGANIZATIONS

POWERS (3)

WATER RESOURCE DEVELOPMENT

IF IT IS ENTRUSTED TO THE PRIVATE SECTOR, THE RESPONSIBILITIES OF WATER RESOURCE MANAGEMENT ORGANIZATIONS MAY BE LIMITED TO ADMINISTERING PROPERTY RIGHTS IN WATER AND REGULATING PRIVATE ACTIVITY IN THE INTERESTS OF CONTROLLING EXTERNAL COSTS IMPOSED UPON OTHERS AND PROTECTING THE PUBLIC INTEREST IN ENVIRONMENTAL QUALITY

HOWEVER, FAR MORE COMMONLY, IT IS EITHER A PUBLIC ACTIVITY OR IS PUBLICLY SUPPORTED, BECAUSE MANY OF THE BENEFITS OF SUCH DEVELOPMENT ARE THOUGHT TO BE PUBLIC GOODS WHICH CANNOT BE MARKETED

ADDITIONALLY, ASSEMBLING PRIVATE CAPITAL TO UNDERTAKE MAJOR DEVELOPMENT PROJECTS IS DIFFICULT IN INDUSTRIALIZED AND NEARLY IMPOSSIBLE IN NON-INDUSTRIALIZED COUNTRIES

THE WATER RESOURCE MANAGEMENT ORGANIZATION IS A LOGICAL CHOICE FOR LOCATING DEVELOPMENT RESPONSIBILITIES (THIS HAS BEEN ITS PRIMARY ROLE)

POWERS (4)

WATER QUALITY CONTROL

IT IS PARTICULARLY DIFFICULT TO ASSIGN THIS RESPONSIBILITY TO THE PRIVATE SECTOR, BECAUSE WATER QUALITY DEGRADATION IS AN EXTERNAL COST

FOR PRIVATE SECTOR MARKET ALLOCATION TO WORK EFFICIENTLY, THE RIGHT TO POLLUTE MUST BECOME A TRANSFERABLE PROPERTY RIGHT. GOVERNMENT ACTION WILL GENERALLY BE NECESSARY TO MONITOR AND ENFORCE THAT RIGHT

THE CREATION AND INITIAL ASSIGNMENT OF POLLUTION RIGHTS WILL INEVITABLY DEPEND UPON GOVERNMENT ACTION

REDUCING TRANSACTIONS COSTS WILL OFTEN REQUIRE GOVERNMENTAL ACTION TO FACILITATE THE ORGANIZATION OF COST-BEARERS INTO EFFECTIVE BARGAINING UNITS

POWERS (5)

WATER QUALITY CONTROL

A SIMPLER AND MORE USUAL, IF LESS EFFICIENT, SOLUTION IS TO ASSIGN RESPONSIBILITY AND COMMESURATE AUTHORITY TO A PUBLIC SECTOR ENTITY

THIS ENTITY FUNCTIONS IN A REGULATORY CAPACITY, ESTABLISHING AND ENFORCING RULES WHICH LIMIT THE RIGHT TO POLLUTE

RULES	REGULATIONS: AMBIENT WATER QUALITY OR EFFLUENT STANDARDS
	INCENTIVES: EFFLUENT TAXES, FEES, OR CHARGES

THE TECHNICAL CAPACITY TO ESTABLISH STANDARDS, AND TO MONITOR AND ENFORCE COMPLIANCE IS OFTEN LACKING, EVEN IN THE MOST INDUSTRIALIZED NATIONS

HENCE, REGULATORY PROGRAMS SHOULD BE VIEWED AS EVOLUTIONARY PROCESSES

INFORMATION (1)

THE INFORMATION REQUIREMENTS FOR EFFECTIVE WATER RESOURCE MANAGEMENT CAN BE QUITE FORBIDDING

FOR EXAMPLE, GROUND WATER DATA CAN ONLY BE OBTAINED FROM NUMEROUS AND COSTLY WELLS, OVER SUBSTANTIAL PERIODS OF TIME

INSTITUTIONAL INNOVATION, TO MAKE THE MOST OF READILY AVAILABLE DATA AND TO DEAL WISELY WITH UNAVOIDABLE UNCERTAINTY, IS OFTEN A BETTER INVESTMENT THAN IS PROTRACTED DATA COLLECTION

BOTH WATER SUPPLY AND FLOOD CONTROL PLANNING ARE PARTICULARLY VULNERABLE TO EXTREME EVENTS, AND PROBABILITY ANALYSIS AND/OR SENSITIVITY ANALYSIS SHOULD BE BASIC TECHNIQUES IN SUCH PLANNING

DECISION MAKING (1)

THERE ARE THREE BASIC METHODS OF MAKING DECISIONS ABOUT PUBLIC POLICIES AND PROGRAMS:

- **BARGAINING**
- **COMMAND**
- **REPRESENTATION**

DECISION MAKING (2)

BARGAINING IS A NON-HIERARCHICAL METHOD IN WHICH EQUALS VOLUNTARILY EXCHANGE OF GOODS AND SERVICES TO THE BENEFIT OF BOTH PARTIES

IT IS A DECENTRALIZED METHOD WHICH OCCURS PROMINENTLY IN MARKET INSTITUTIONS, BUT ALSO IN LEGISLATURES, COMMITTEES, AND MANY OTHER FORMS OF ORGANIZATION

COMPETING INTERESTS FIND COMMON GROUND

EXAMPLE: THE USE OF ECONOMIC INCENTIVES

DECISION MAKING (3)

COMMAND IS A CENTRALIZED HIERARCHICAL METHOD, IN WHICH ENTITIES AT THE TOP OF THE HIERARCHY (OFTEN THE CENTRAL GOVERNMENT, BUT ALSO SOMETIMES UPPER ELEMENTS OF A BUREAUCRACY, CORPORATION, OR ASSOCIATION) MAKE DECISIONS WHICH AFFECT, AND ARE CARRIED OUT BY ENTITIES LOWER DOWN IN THE HIERARCHY

SOCIETY ARTICULATES AND PURSUES COMMON PURPOSE

EXAMPLE: NATIONAL AUTHORITIES USE COMMAND TO ENSURE THAT LOCAL AND REGIONAL PROGRAMS DO NOT WORK AGAINST NATIONAL OBJECTIVES WHILE PURSUING THEIR INDIVIDUAL PURPOSES

DECISION MAKING (4)

REPRESENTATION IS A DECENTRALIZED HIERARCHICAL METHOD BY WHICH ENTITIES LOW IN THE HIERARCHY CONTROL LEADERS HIGHER IN THE HIERARCHY

HIERARCHIES ARE CONSTRAINED TO SEEK THE COMMON INTEREST

EXAMPLE: ADVISORY BOARDS OR COMMITTEES, MADE UP OF REPRESENTATIVES OF STAKEHOLDER INTEREST GROUPS AFFECTED BY WATER RESOURCE MANAGEMENT, ARE OFTEN USED TO ENSURE THAT THE VIEWS AND DESIRES OF SUCH STAKEHOLDERS ARE NOT OVERLOOKED

BENEFITS AND COSTS (1)

WATER RESOURCE MANAGEMENT DECISIONS ALWAYS INVOLVE BENEFITS AND COSTS.

CONSIDERATION OF BENEFITS AND COSTS SHOULD NOT BE LIMITED TO THOSE AFFECTING THE BUDGETS OF WATER RESOURCES AUTHORITIES.

THEY SHOULD INCLUDE ALL OF THE MATERIAL CONSEQUENCES, TO WHOMSOEVER THEY MAY ACCRUE, AND WHETHER MEASURABLE IN MONETARY TERMS OR NOT, WHICH ARE EXPECTED TO RESULT FROM IMPLEMENTING WATER RESOURCE MANAGEMENT DECISIONS.

THREE ASPECTS OF THESE BENEFITS AND COSTS ARE IMPORTANT FOR WATER RESOURCE MANAGEMENT:

THEIR **MAGNITUDES**
INCIDENCE
INFLUENCE UPON BEHAVIOR

BENEFITS AND COSTS (2)

*THE **MAGNITUDES** OF BENEFITS AND COSTS INFLUENCE WHETHER PROPOSED PROGRAMS OR PROJECTS ARE ECONOMICALLY EFFICIENT.*

BENEFIT-COST ANALYSIS IS THE ANALYTICAL TOOL MOST OFTEN USED TO ASSESS ECONOMIC EFFICIENCY.

*THESE **MAGNITUDES** ALSO DETERMINE FINANCIAL FEASIBILITY (NOT ALL ECONOMICALLY EFFICIENT PROJECTS ARE FINANCIALLY FEASIBLE, AND NOT ALL FEASIBLE PROJECTS ARE EFFICIENT!)*

GENERALLY SPEAKING, ONLY EFFICIENT AND FEASIBLE PROJECTS SHOULD BE PURSUED, BECAUSE TO DO OTHERWISE DIVERTS SCARCE RESOURCES FROM MORE PRODUCTIVE USES.

HOWEVER, ECONOMIC EFFICIENCY IS NOT THE ONLY GOAL, AND OCCASIONALLY MODESTLY INEFFICIENT PROJECTS MAY BE JUSTIFIED FOR THEIR DISTRIBUTIONAL, ENVIRONMENTAL, OR OTHER NON-EFFICIENCY ATTRIBUTES.

BENEFITS AND COSTS (3)

WATER RESOURCE MANAGEMENT PROGRAMS ARE LIKELY TO ENJOY PUBLIC ACCEPTANCE AND SUPPORT WHEN THE ***INCIDENCE*** *OF BENEFITS AND COSTS IS CONSISTENT WITH PREVAILING SOCIAL NORMS OF FAIRNESS AND EQUITY.*

OTHERWISE, THEY MAY BE PERCEIVED AS UNJUST, AND THEIR IMPLEMENTATION RESISTED AND THWARTED.

PATENTLY INEQUITABLE PROJECTS SHOULD NO MORE BE PURSUED THAN SHOULD HIGHLY INEFFICIENT ONES.

IT SHOULD BE NOTED THAT ESTIMATES OF THE MAGNITUDES OF BENEFITS AND COSTS ARE NOT UNRELATED TO THE DISTRIBUTION OF THOSE BENEFITS AND COSTS.

WILLINGNESS TO PAY IS THE ACCEPTED MEASURE, BUT WILLINGNESS TO PAY DEPENDS UPON ABILITY TO PAY, WHICH MAY BE VERY UNEQUALLY DISTRIBUTED.

BENEFITS AND COSTS (4)

INFLUENCE UPON BEHAVIOR

PROPERLY DESIGNED COST (AND BENEFIT) ALLOCATIONS CAN CREATE THE INCENTIVES WHICH MOTIVATE PERSONS AND GROUPS TO WORK TOWARDS THE ATTAINMENT OF WATER RESOURCE MANAGEMENT OBJECTIVES.

ALL OF THE EFFECTS OF BASIN MANAGEMENT ACTIVITIES ARE EXPERIENCED BY PERSONS AND GROUPS, AND ALL WILL AFFECT THE ***BEHAVIOR*** *OF THESE PERSONS AND GROUPS.*

IT IS IMPORTANT THAT THE ***BEHAVIOR WHICH IS SO INFLUENCED*** *BE CONSISTENT WITH WATER RESOURCE MANAGEMENT OBJECTIVES, ELSE IT IS LIKELY TO FRUSTRATE THEM.*

EXAMPLE: THE SUBSIDIZATION OF WATER SUPPLIES, FOR IRRIGATION, INDUSTRIAL, OR DOMESTIC USES, IN AN ATTEMPT TO ENCOURAGE DEVELOPMENT.

WATER WHICH IS UNDERPRICED WILL BE OVERUSED, AND IN A WATER-SHORT ENVIRONMENT THIS WILL ULTIMATELY CONSTRAIN DEVELOPMENT RATHER THAN ADVANCE IT, BECAUSE IT WILL NOT BE SUSTAINABLE IN

LEVELS OF ACTION (OR DECISION-MAKING) (1)

WATER USE LEVEL (OPERATIONAL LEVEL)

WATER MAY BE USED FOR

MUNICIPAL, DOMESTIC, AND INDUSTRIAL PURPOSES,
IRRIGATION,
GENERATING ELECTRICITY,
WASTE OR RESIDUALS DISPOSAL,
FISHERIES,
NAVIGATION,
RECREATION,
MAINTAINING AQUATIC, TERRESTRIAL AND MARINE ENVIRONMENTS.

TERRESTRIAL LAND USES MAY DEPEND UPON A RELIABLE WATER SUPPLY AND UPON PROTECTION FROM SUCH NATURAL WATER HAZARDS AS FLOODS AND POOR DRAINAGE.

LEVELS OF ACTION (2)

WATER USE LEVEL

ACTIONS AT THE WATER USE (OPERATIONAL) LEVEL ARE THOSE TAKEN TO MANIPULATE THE ENVIRONMENT. THESE ACTIONS DIRECTLY DETERMINE THE WELL-BEING OF HUMANS AND ECOSYSTEMS.

MOST ACTION AT THIS LEVEL IS PERFORMED BY INDIVIDUALS OR PRIVATE GROUPS, AS THEY ATTEMPT TO MAKE THE ENVIRONMENT WORK FOR THEIR WELL-BEING.

EXAMPLES:
DIVERTING WATER FOR IRRIGATION,
DISCHARGING WASTES INTO A STREAM,
EXPLOITING THE POTENTIAL ENERGY OF A RIVER FOR GENERATING HYDROELECTRIC POWER,
USING A LAKE FOR COMMERCIAL, SUBSISTENCE, OR RECREATIONAL FISHING AND,
PERVERSELY, SUFFERING THE DAMAGE CAUSED BY A FLOOD.

LEVELS OF ACTION (3)

WATER USE LEVEL

***RULES** ARE ALWAYS NECESSARY TO FACILITATE WATER USE.*

*THESE **WATER USE INSTITUTIONS** MAY TAKE SUCH FORMS AS*

QUANTITATIVE ALLOCATIONS TO WITHDRAW AND CONSUME WATER,
WASTE DISCHARGE LIMITATIONS,
NAVIGATION RULES,
RESERVOIR RULE CURVES

THEY MAY BE ESTABLISHED BY
CUSTOM,
MARKET TRANSACTIONS,
STATUTE,
COURT DECISIONS,
ADMINISTRATIVE PROCEEDINGS.

LEVELS OF ACTION (4)

WATER USE LEVEL

*THERE ARE MANY WAYS IN WHICH THE **WATER USE INSTITUTIONS** MAY BE LESS THAN EFFECTIVE IN DEALING WITH CHANGING CONDITIONS.*

EXAMPLES:
LACK OF COORDINATION BETWEEN SURFACE WATER RIGHTS AND GROUND WATER RIGHTS (IF ANY).

IN MANY COUNTRIES, THE LAWS GOVERNING THE ALLOCATION OF SURFACE WATERS WERE ESTABLISHED BEFORE MODERN HYDROLOGY HAD CLARIFIED THE INTERRELATIONSHIPS BETWEEN SURFACE WATER AND GROUND WATER.

GROUND WATER WITHDRAWAL WAS A PREROGATIVE OF LAND OWNERSHIP, AND WAS NOT GOVERNED BY WATER LAWS.

CONSEQUENTLY, CONJUNCTIVE MANAGEMENT OF SURFACE WATER AND GROUND WATER, ALTHOUGH ECONOMICALLY AND ECOLOGICALLY DESIRABLE, WAS DIFFICULT OR IMPOSSIBLE TO ACHIEVE.

THIS PROBLEM CONTINUES TO EXIST IN MANY COUNTRIES TO THIS DAY.

*IT IS AN EXAMPLE OF DEFECTIVE **SCOPE** RULES. THE USES OF CLOSELY INTERRELATED RESOURCES ARE GOVERNED BY SEPARATE, NARROW, AND UNCOORDINATED INSTITUTIONS.*

LEVELS OF ACTION (5)

WATER USE LEVEL

LACK OF PARTICIPATION BY STAKEHOLDERS OTHER THAN CONSUMPTIVE WATER USERS

WATER RIGHTS LAWS OFTEN REQUIRE DIVERSION AND BENEFICIAL (CONSUMPTIVE) USE AS A CONDITION OF OBTAINING A WATER RIGHT, WITH FEW OR NO INSTREAM USES DEFINED TO BE BENEFICIAL.

THERE IS NO SUCH THING AS A RIGHT TO INSTREAM FLOW.

*SUCH A **POSITION** RULE DEFICIENCY DISCRIMINATES AGAINST WHOLE CLASSES OF STAKEHOLDERS, CREATES BOTH INEQUITY AND INEFFICIENCY, AND INVITES ENVIRONMENTAL DEGRADATION.*

***A CONSUMPTIVE WATER USER IS EXPOSED TO WATER QUALITY DEGRADATION** PRODUCED BY UPSTREAM USERS, BUT LACKS THE RIGHT TO BE PROTECTED AGAINST SUCH IMPACTS.*

*THIS IS A DEFECT IN **AUTHORITY** RULES, ESPECIALLY IF THERE EXISTS NO RIGHT TO BUY RELIEF ON THE PART OF THE DOWNSTREAM PARTY OR TO SELL IT, ON THE PART OF THE POLLUTER..*

THE FOREGOING ILLUSTRATIONS ARE ONLY THREE OF MANY TYPES OF COMMON WATER USE RULE DEFICIENCIES WHICH CAN CAUSE INEFFICIENCY, INEQUITY, AND/OR ENVIRONMENTAL DEGRADATION.

*THE FUNCTION OF ACTIVITY AT THE HIGHER **WATER RESOURCE MANAGEMENT LEVEL** IS TO IDENTIFY AND RESOLVE SUCH PROBLEMS*

LEVELS OF ACTION (6)

WATER RESOURCE MANAGEMENT LEVEL (INSTITUTIONAL LEVEL)

THE PURPOSE OF WATER RESOURCES MANAGEMENT IS TO CORRECT PROBLEMS AT THE WATER USE LEVEL THROUGH CHANGING THE MENTIONED INSTITUTIONS, OR THROUGH CHANGING ENVIRONMENTAL OR SOCIAL CONDITIONS OTHER THAN RULES.

THE ESSENCE OF THE WATER RESOURCES MANAGEMENT PROCESS IS TO DETERMINE WHICH WATER USE RULES OUGHT TO BE CHANGED, AND IN WHAT WAYS, IN EACH SITE-SPECIFIC SITUATION.

ACTIONS AT THE WATER RESOURCE MANAGEMENT (INSTITUTIONAL) LEVEL ARE THOSE AIMED AT INFLUENCING WATER USES AND USERS.

THE DESIGN, ADOPTION, AND IMPLEMENTATION OF PUBLIC PROGRAMS OCCURS AT THE INSTITUTIONAL LEVEL.

EXAMPLES OF ACTION:

WATER RESOURCES PLANNING

WATER RESOURCES MANAGEMENT IS A BROADER EXAMPLE, BECAUSE IT INCLUDES NOT ONLY THE DESIGN OF PLANS AND PROGRAMS BUT ALSO THEIR ADOPTION AND IMPLEMENTATION.

LEGISLATING, ADJUDICATING, AND ADMINISTRATIVE RULE-MAKING (MORE GENERAL).

LEVELS OF ACTION (7)

WATER RESOURCE MANAGEMENT LEVEL

WATER RESOURCE MANAGEMENT *ACTIVITIES ARE THEMSELVES SUBJECT TO RULES, WHICH GOVERN:*

THE SCOPE OF THE DECISION MAKING PROCESS,

WHO PARTICIPATES AND HOW,

WHAT INFORMATION IS CONSIDERED AND HOW IT IS COLLECTED AND DISTRIBUTED,

HOW COLLECTIVE CHOICES ARE MADE, AND

HOW COSTS ARE SHARED.

LEVELS OF ACTION (8)

WATER POLICY AND LAW LEVEL (CONSTITUTIONAL LEVEL)

*ACTIONS AT THE **WATER RESOURCE POLICY AND LAW (CONSTITUTIONAL) LEVEL** DETERMINE THE RULES FOR ACTIONS TAKEN AT THE WATER RESOURCE MANAGEMENT LEVEL.*

THEY HAVE PROVIDED THE BASIC CONTEXT WITHIN WHICH PROGRAMS OPERATE, AND THE CONSTRAINTS WHICH MUST BE OBSERVED IN PROGRAM DESIGN, ADOPTION, AND IMPLEMENTATION.

NORMALLY, AS WE LOOK AT INSTITUTIONAL LEVEL ACTIVITIES SUCH AS WATER RESOURCES MANAGEMENT, HIGHER LEVEL POLICIES AND LAWS MAY BE REGARDED AS FIXED AND IMMUTABLE.

IN SOME CASES, HOWEVER, WATER POLICIES AND LAWS ARE TAKEN TO BE OPEN TO CHANGE, AS WELL, BECAUSE IMPROPERLY STRUCTURED LAWS AND POLICIES CAN FRUSTRATE EVEN THE BEST WATER RESOURCE MANAGEMENT ACTIVITIES AT THE RIVER BASIN OR REGIONAL LEVEL.

DEVELOPING A COMPREHENSIVE STRATEGY FOR WATER RESOURCE MANAGEMENT IN ANY COUNTRY IS A HIGH LEVEL PROCESS WHICH DEFINES THE RULES WHICH WATER RESOURCE MANAGEMENT PROCESSES AT THE BASIN AND REGIONAL LEVEL MUST FOLLOW.

LEVELS OF ACTION (9)

WATER POLICY AND LAW LEVEL

IDEALLY, DEVELOPING A COMPREHENSIVE STRATEGY SHOULD PRECEDE, AND PROVIDE THE INSTITUTIONAL BASIS FOR THE DEVELOPMENT OF WATER RESOURCE MANAGEMENT STRATEGIES FOR INDIVIDUAL RIVER BASINS OR REGIONS.

SUCH A PROCESS WILL NOT REQUIRE BUILDING FORMAL HYDROLOGIC-ENVIRONMENTAL-ECONOMIC-INSTITUTIONAL MODELS.

HOWEVER, LESS FORMAL AND LESS DETAILED UNDERSTANDING OF THE COMPLEX SYSTEMS TO BE MANAGED ARE ESSENTIAL.

A COMPREHENSIVE WATER RESOURCE MANAGEMENT STRATEGY, WHETHER AT THE NATIONAL OR THE REGIONAL OR BASIN LEVEL, IS NOT TO BE CONFUSED WITH WHAT HAS TRADITIONALLY BEEN TERMED A NATIONAL WATER PLAN.

SUCH PLANS HAVE OFTEN TAKEN THE FORM OF A SET OF WATER RESOURCE DEVELOPMENT PROJECTS TO BE BUILT AT SOME FUTURE TIME.

ALTHOUGH THEY HAVE USUALLY INCLUDED INSTITUTIONAL DESCRIPTIONS AND, PERHAPS, ECONOMIC AND/OR ENVIRONMENTAL IMPACT PROJECTIONS, THEY HAVE NOT FOCUSED UPON NON-STRUCTURAL OPTIONS.

A COMPREHENSIVE STRATEGY HAS A VERY DIFFERENT FOCUS, AND WILL NOT NORMALLY INCLUDE PLANS FOR INDIVIDUAL DEVELOPMENT PROJECTS.