Workshop of the Research Project
on "Wisdom of land and Water Management"
November 13-14, 2011, at RIHN

Overview and Research Plan of the Project on "Designing Local Framework of Integrated Water Resources Management"

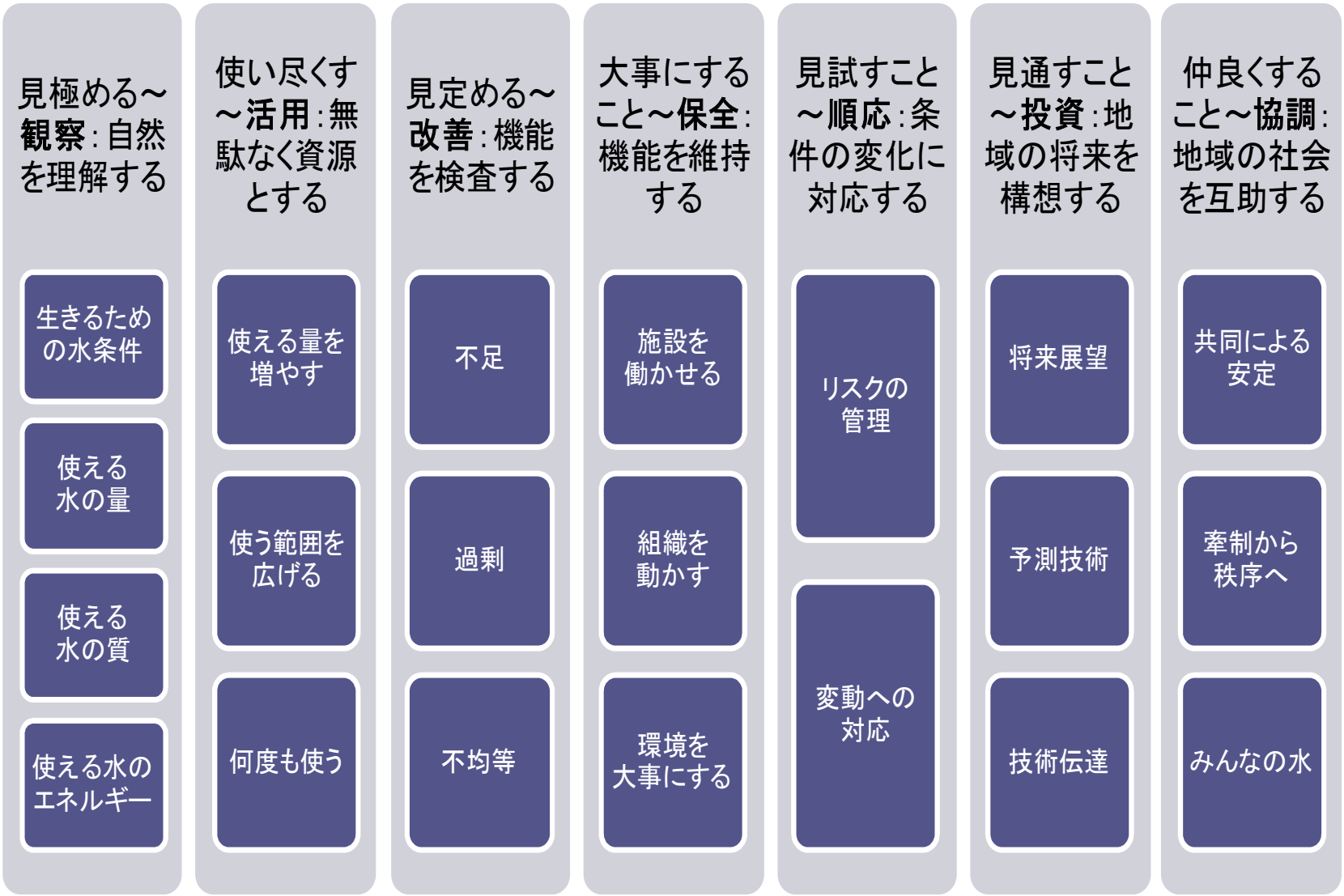
Tsugihiro WATANABE (RIHN)

Slide Stocks

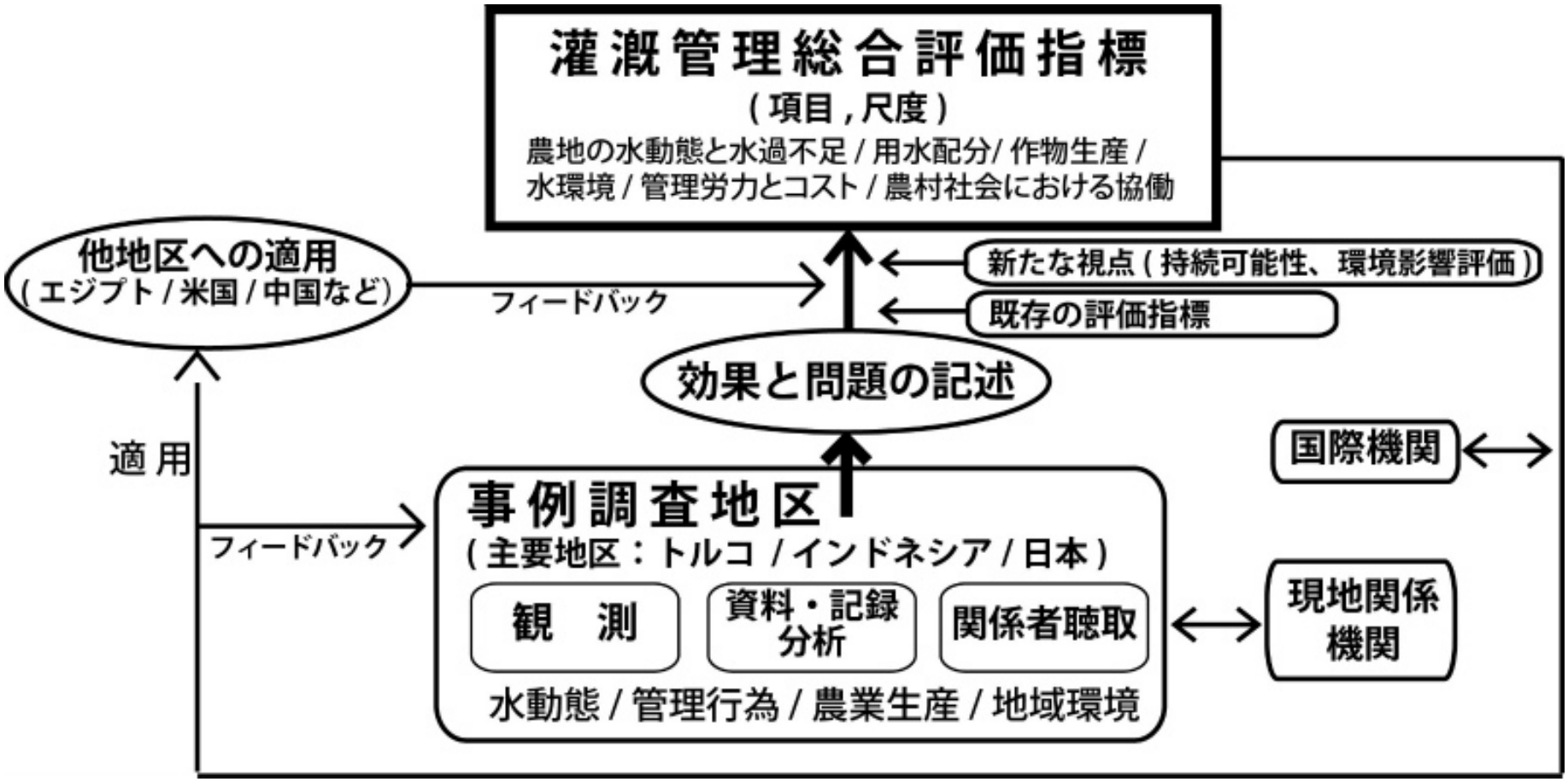
《水土の知》

- 水とどのようにつきあうのか，自然の水の循環をどのように調整するかは，地域における人と自然の関わり，すなわち社会や文化の根幹を築く．
- 水に限らず，地域の自然環境と，それに適応し，積極的に働きかけていく人間の営みがつくり出す「環境の総体」を《水土》ということにする．　cf.「風土」
- 営みや結果としてできあがる土地利用，施設や装置とその配置，これらを築き運用管理していく技能や技術，担う体制や組織，人材育成などをも含む体系である．
- 水条件を調整する技術と組織の体系としての「水利」は，《水土》を構成する「知」と認識できる．《水土の知》

《水土の知》～水～機能

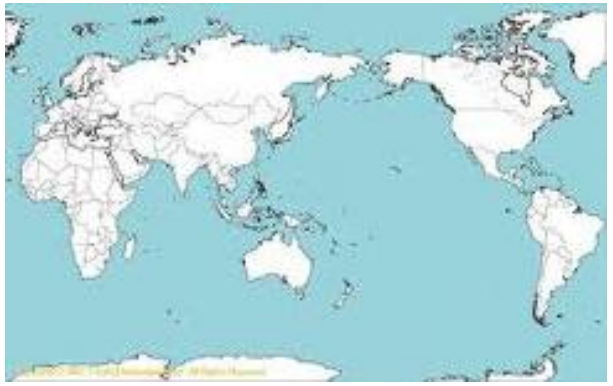

見極める～観察：自然を理解する
生きるための水条件
使える水の量
使える水の質
使える水のエネルギー
使い尽くす～活用：無駄なく資源とする
使える量を増やす
使う範囲を広げる
何度も使う
見定める～改善：機能を検査する
不足
過剰
不均等
大事にすること～保全：機能を維持する
施設を働かせる
組織を動かす
環境を大事にする
見試すこと～順応：条件の変化に対応する
リスクの管理
変動への対応
見通すこと～投資：地域の将来を構想する
将来展望
予測技術
技術伝達
仲良くすること～協調：地域の社会を互助する
共同による安定
牽制から秩序へ
みんなの水

灌漑管理統合評価指標


灌漑管理総合評価指標
(項目, 尺度)
農地の水動態と水過不足 / 用水配分/ 作物生産 /
水環境 / 管理労力とコスト / 農村社会における協働
他地区への適用
(エジプト / 米国 / 中国など)
フィードバック
新たな視点 (持続可能性、環境影響評価)
既存の評価指標
効果と問題の記述
適用
フィードバック
国際機関
事例調査地区
(主要地区：トルコ / インドネシア / 日本)
観　測
資料・記録
分析
関係者聴取
現地関係
機関
水動態 / 管理行為 / 農業生産 / 地域環境

Main Case Study Areas

The Globe

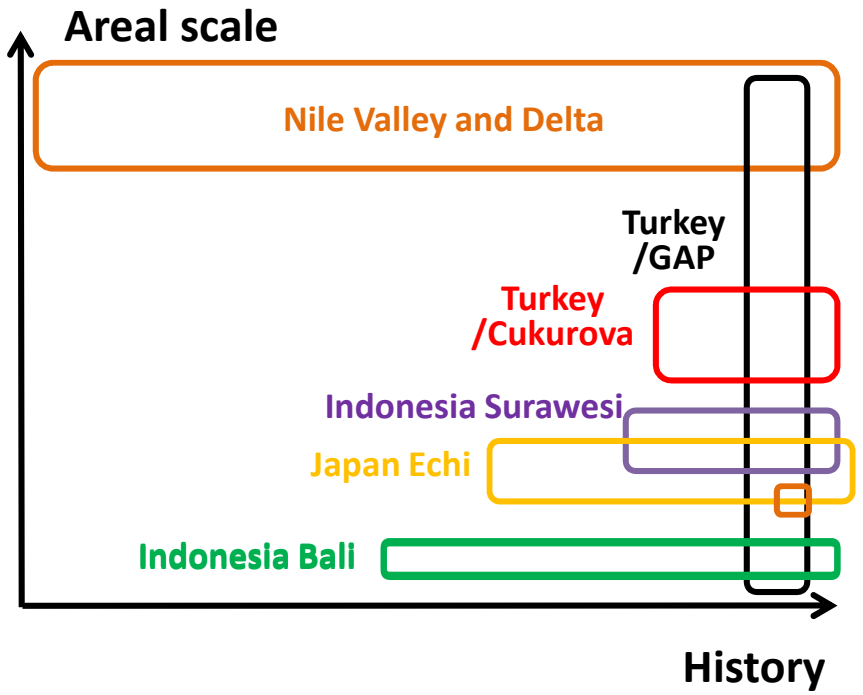


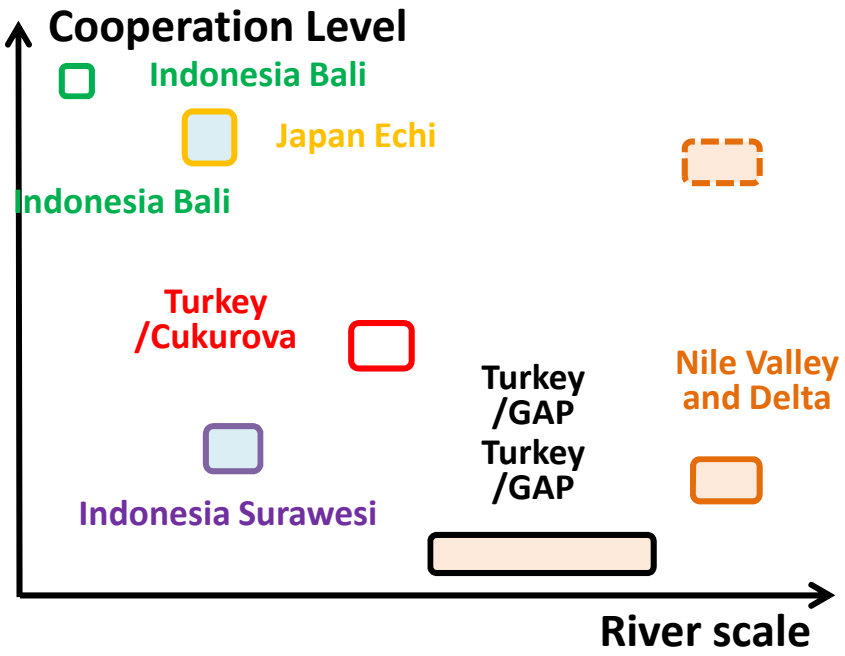
- GAP Region of southeast Turkey
- Çukurova Region of Turkey
- Nile Valley and Delta of Egypt
- Bali Island of Indonesia
- South Sulawesi or Sumatra Islands of Indonesia
- Echigawa Region of Japan
- Zhanghe Region of China

- Topography
- Hydrology
- Meteorology
- Area scale
- History of the system
- Recent development progress

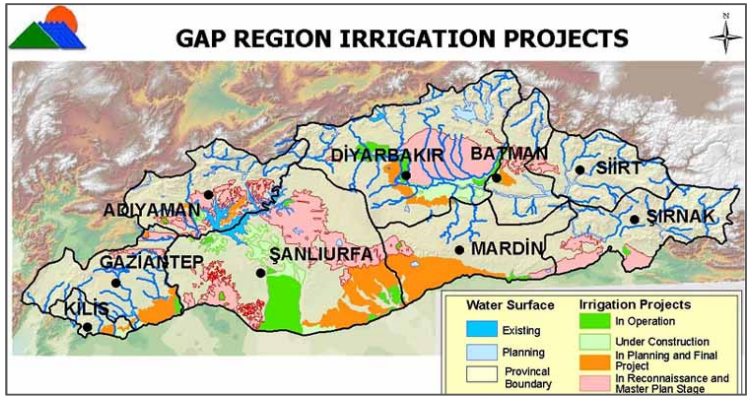
Main Case Study Areas

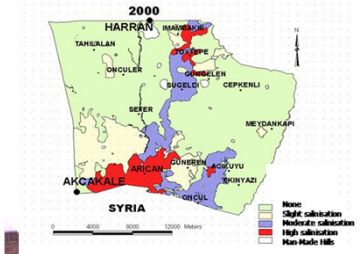
- Focusing on different aspects of water management systems, including the establishment process, spatial scale, and other background circumstances.
- The major case study areas are selected according to the conditions of topography, hydrology, meteorology of the region, scale and history of the system, and recent development progress:





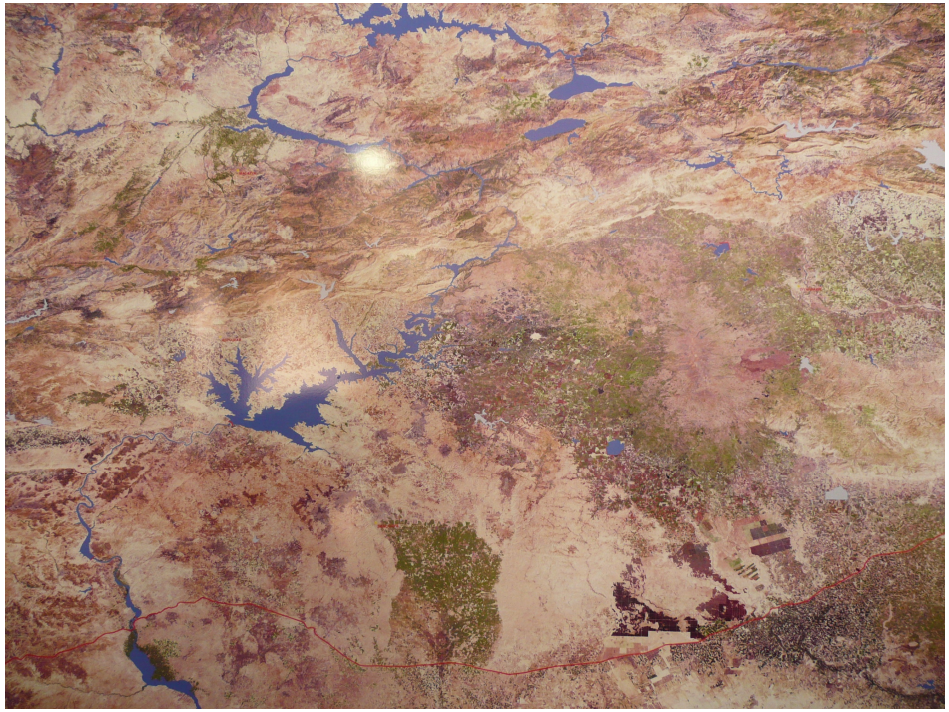
GAP Region of Southeast Turkey

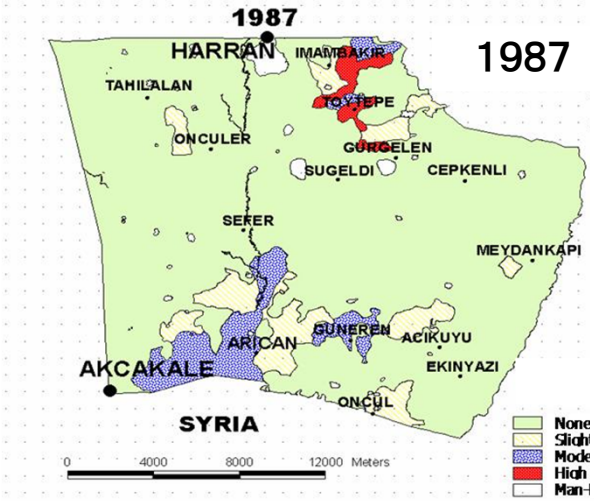


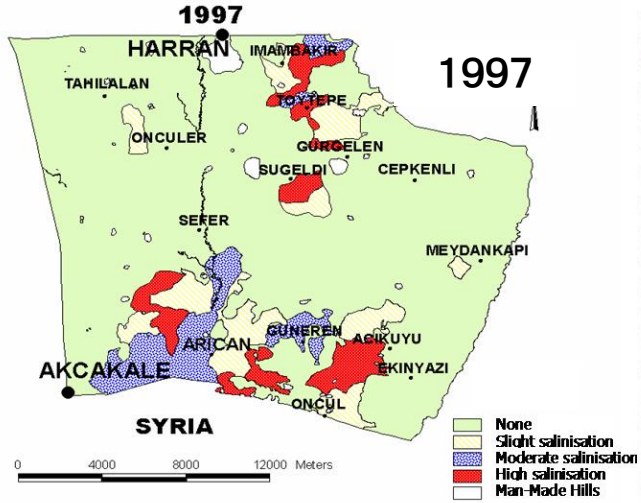


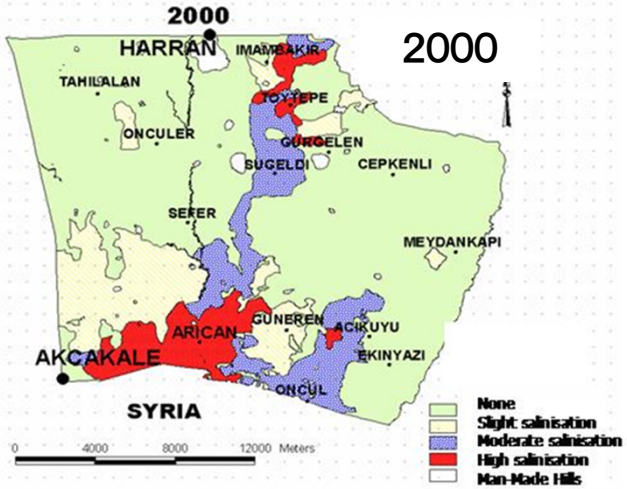
- Southeast Anatolia Development Project
- Annual Precipitation: 300-1000mm
- On-going large–scale water resources development and expansion of irrigation
  - 22 large reservoirs
  - Irrigation for 1.8Mha
  - 270,000ha irrigated
- Changes in cropping system according to expansion of irrigation
- Expansion of area with soil salinity
- Traditional water use and impacts of irrigation
- Possible comparative studies in the project area
- Development of water management organizations
- Future plan of land and water management (GAP authority)

Soil Salinization in the GAP Region

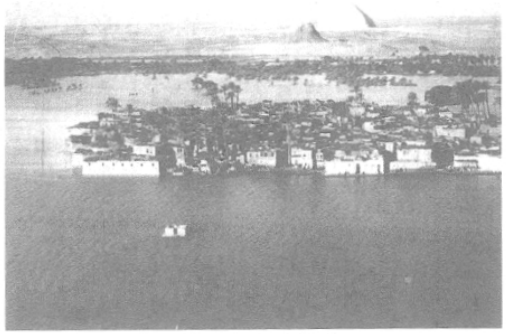


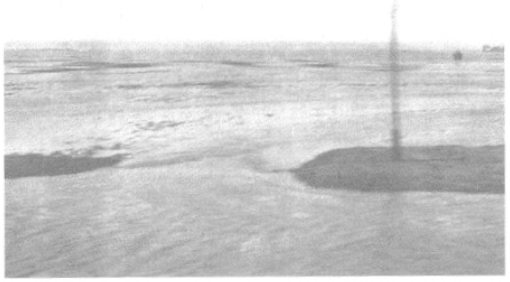






Nile Valley and Delta of Egypt





Bu Hiroshi KATOH

Sub-surface drain

- 2.9M ha of irrigated areas
- No/Zero effective rainfall
- Long history of use of the Nile water with more than 5000 years
- “Sustainable” basin irrigation
  - Changes in the long history
  - Influences of variable discharge
- Modernization form 19C
  - Diversion and perennial irrigation
  - Construction of the Aswan High Dam and artificial regulated river flow
- Changes of flood damage and expansion of soil salinity
- Reconstruction of hydrological regime and farmland conditions
- Long-term water management vision of NWRC

Bali and South Sulawesi of Indonesia

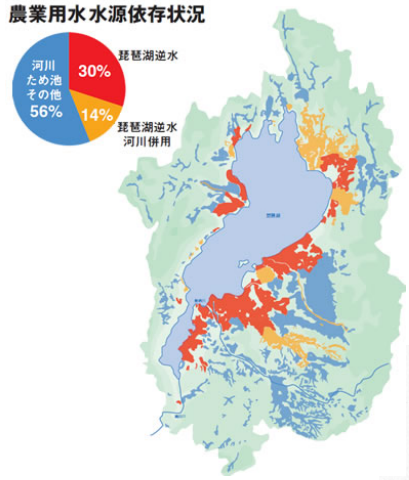
Bali

- Subak: traditional water use system
- Annual precipitation: 2,300mm
- Paddy: 90,000 ha, harvested :170,000ha
- Agriculture and society adapting to climate and topography
- Culture and governmental policy
- Detailed studies in 1990s by Mizutani and Kayane, and recent changes
- Proto type of cooperative irrigation system
- Collaboration with Udayana University

South Sulawesi

- Governmental Projects
- Japan's ODA
- Modern system development on the traditional system
- Empowerment of water users association
- Activities of NGO
- Proposal of water management improvement
- Collaboration with Hasanuddin University

Koto Region of Shiga Prefecture, Japan



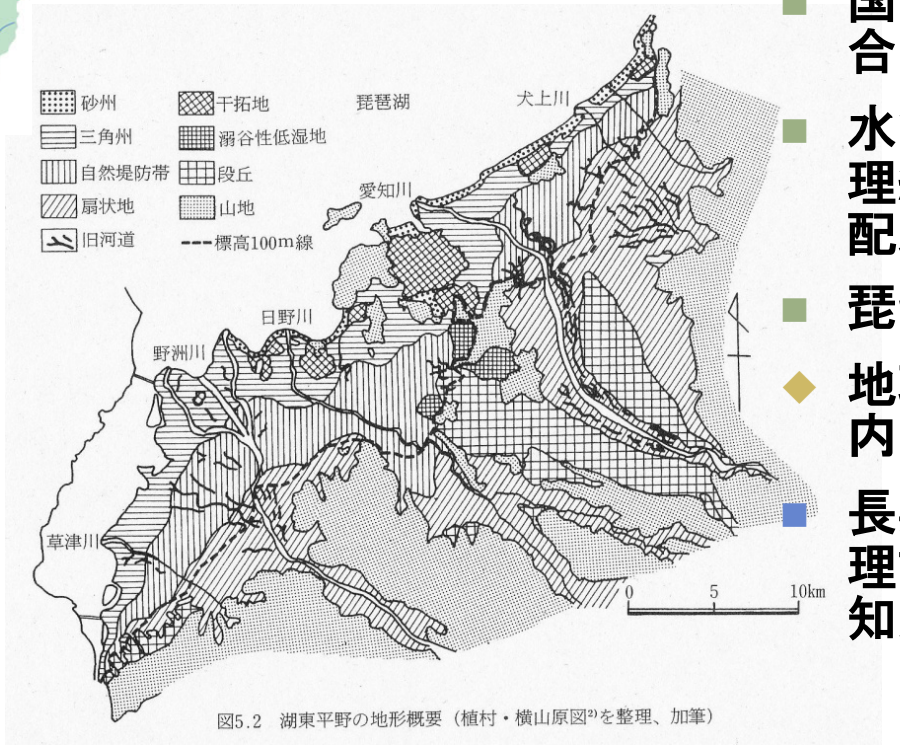


図5.2　湖東平野の地形概要（植村・横山原図[2]を整理、加筆）

- 愛知川地域中心
- 年降水量1400mm
- 歴史的農地拡大・灌漑施設整備
- 国営農業水利事業・琵琶湖総合開発事業
- 水管理範囲の広域化，広域管理組織形成，複雑な水源・送配水系統
- 琵琶湖との関係
- 地球研プロジェクトE-01（PL谷内）の成果
- 長期（ダム建設中止後）水管理計画の検討（水土里ネット愛知川）

Koto Region of Shiga Prefecture, Japan

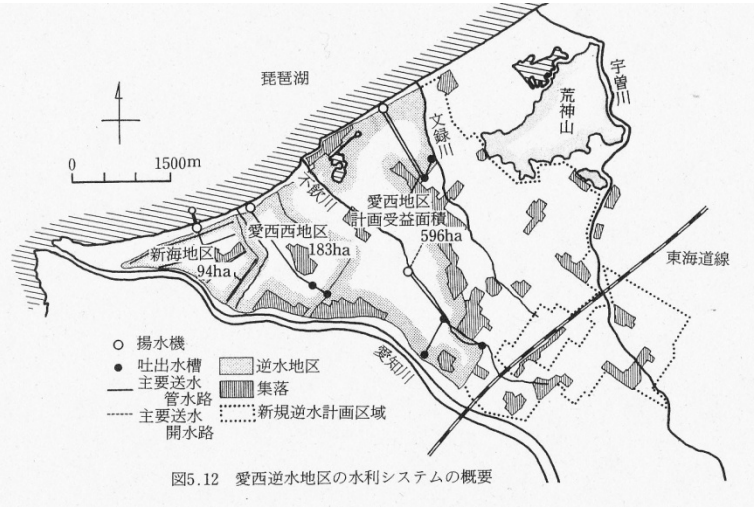


図5.12　愛西逆水地区の水利システムの概要

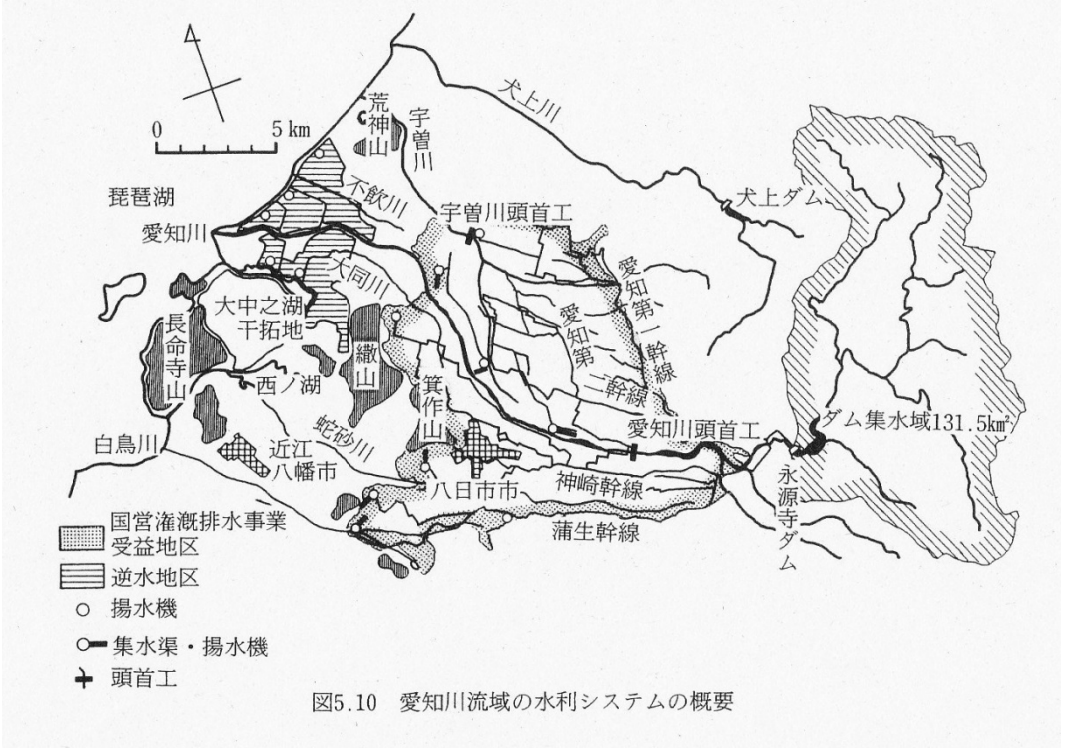
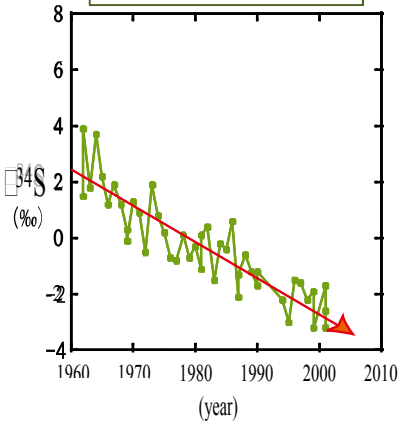


図5.10　愛知川流域の水利システムの概要

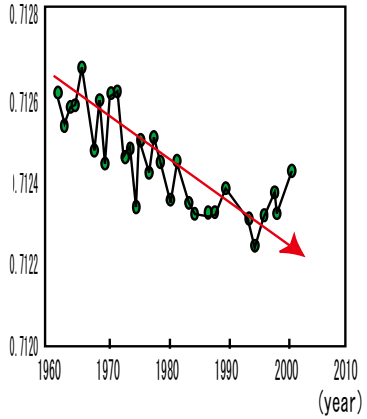
Koto Region of Shiga Prefecture, Japan

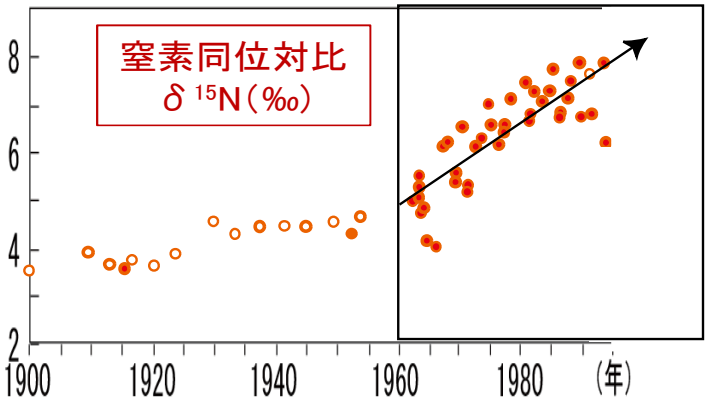
魚に含まれている三種類の安定同位体比から求めた琵琶湖湖水の経年変化

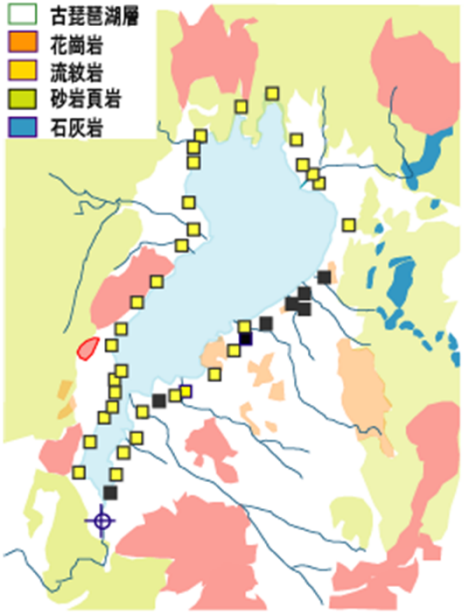
硫黄同位対比
$\delta^{34}S$（‰）



ストロンチウム同位対比
$^{87}Sr/^{86}Sr$（‰）



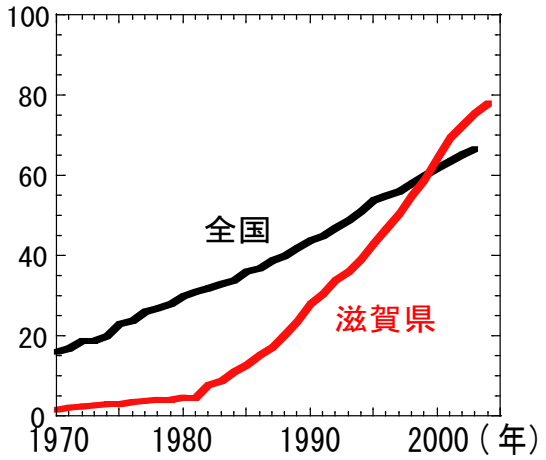




軽い硫黄とストロンチウム，重い窒素

重い硫黄あるいは重いストロンチウムあるいは軽い窒素

下水道普及率(%)



資料提供：中野孝教（地球研）

Second Phase of RIHN (2010~)

“Designing the future society”

- Beyond analyzing the relationship between humanity and nature
- Going to challenge to establishing the new paradigms of environmental thoughts, or designing the “futurable” society
  - Development of methodology
  - Humanics; consiliense for futurability
  - Public and academic communications

The Philosophy of RIHN

- RIHN's basic understanding:
  - The root of so-called environmental problems lies in **human culture,**
  - in the broadest sense of the word, that is, in the human attempt to control nature.
- The English name of the institute implies:
  - The RIHN's mission is to endeavor to understand the manifold **relationship between humanity and nature.**

Goal of the Project

Goal of Project C-09

- Designing “Local Water Management Framework”
  - For the development of an infrastructure for efficient and resource-saving food production, and
  - For the provision of possible measures to solve the global environmental problems induced by lack of water management.

Outcomes of the completed and on-going RIHN Projects

- Local water management
  - key for solving problems of imbalanced regional water regime and degraded water quality. (C-03, R-01, R-02, E-01)
- Major aspects for further researches
  - Impacts of local water management on regional environment (C-01, C-03, C-04, R-01, R-03, H-01)
  - Hierarchical structure of management organization for basin water resources management (E-01, C-03)
  - Well function of water management organization for adapting to the global changes (C-01, R-01)

Local Water Management System

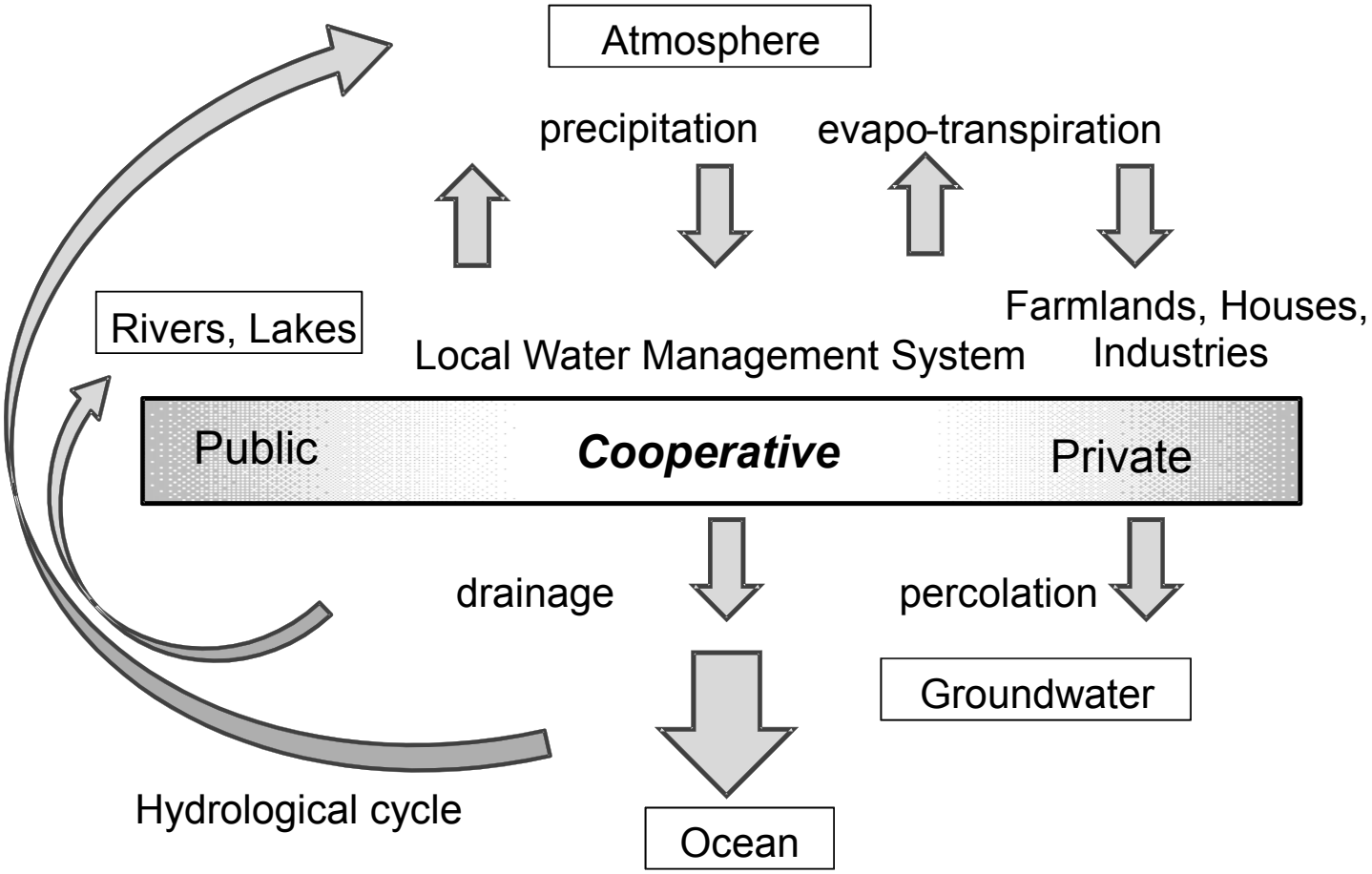
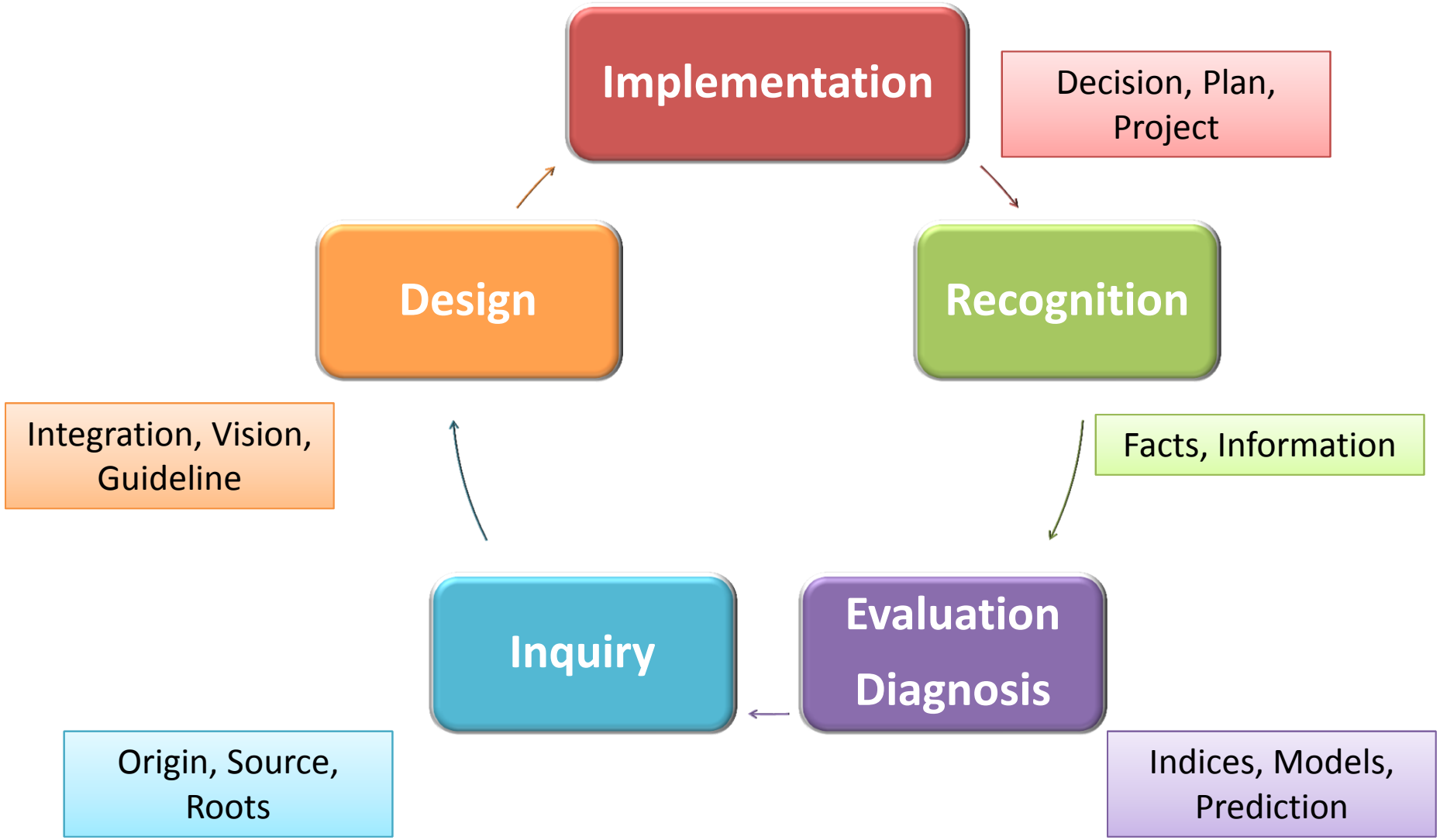


Fig. Conceptual Diagram of Local Water Management System

Futurable system of local resources management
“cooperation” “commons”

Local Land and Water Management



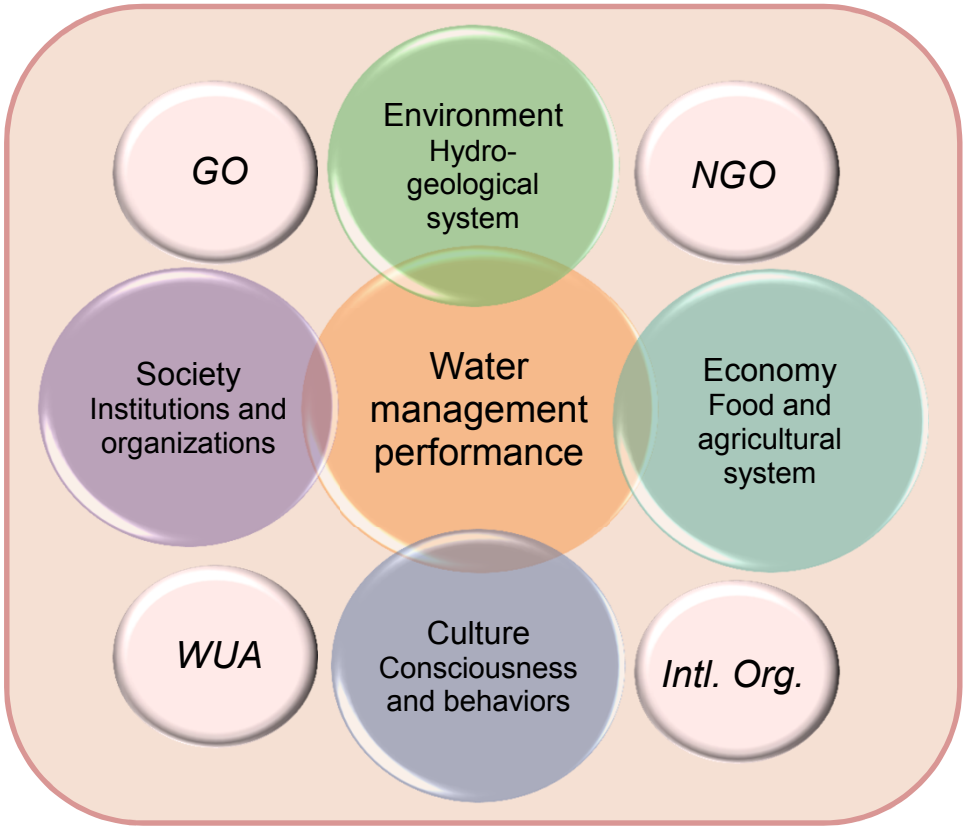
Main Case Study Areas

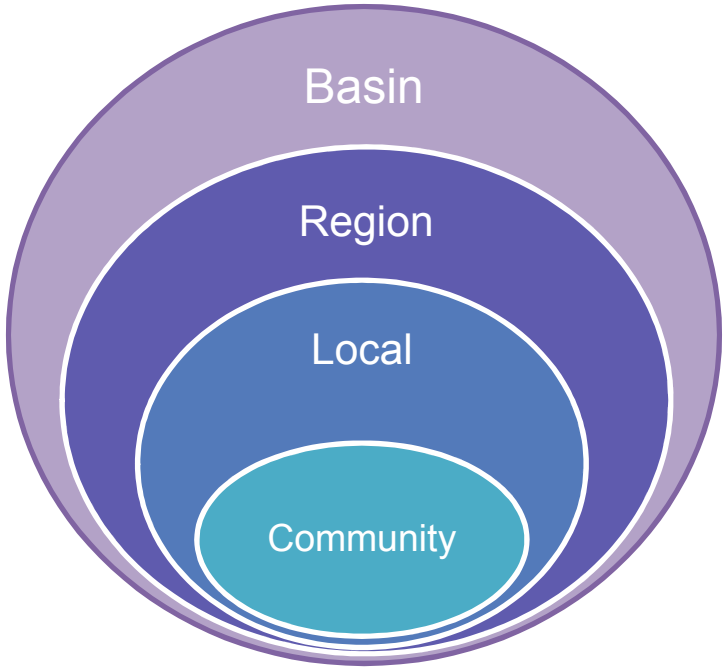
Area	GAP	Cukurova	Bali	South-Sulawesi	Nile Valley and Delta	Koto-Echigawa	Zhanghe
Country	Turkey	Turkey	Indonesia	Indonesia	Egypt	Japan	China
Scale	sub-basin	regional	regional	regional	basin	regional	regional
Climate	semi-arid	semi-arid	humid	humid	arid	humid	semi-arid
Agriculture	wheat/maize	wheat/maize	rice	rice	rice	rice	wheat/maize
Irrigation type	depending reservoir	depending reservoir	flow mamanegent	depending reservoir	depending reservoir	depending reservoir	flow mamanegent
Water resources	River/ reservoir	River/ reservoir	River	River/ reservoir	River/ reservoir	River/ reservoir	River/ reservoir
Irrigation project	developing	developed	developed	developing	developed	developed	developed
Management	establishing	improving	steady	establishing	reorganizing	reorganizing	improving
Problems	water logging and soil salinity	over use and un-equity	function of organization	water distribution	water distribution and environment	water distribution and environment	water distribution and environment

Time schedule

Year	Period	Notice	Field work	Models	Indices	Report	International activity
1: 2011-12	Immediate startup	Refining the objectives and Method Strengthening	Organizing and implementation	Improvement	Development	Kick-off	6th WWF
2: 2012-13	Gaining	Acquisition of basic information	Intensive works	Calibration	Development and analysis	Interim	WWW2012
3: 2013-14	Analysis	Drafting framework Communicating with international societies	Intensive works	Application	Analysis	Progress	WS with FAO and IWM
4: 2014-15	Integration	Crafting framework Drafting final report	Following-up	Outputs analysis	Improvement	Advance	7th WWF ICID2014
5: 2015-16	Conclusion	Disseminating satndard model and guideline				Final	RIHN Intl. Symposium
2016-	Following-up and handing over	Publications					8th WWF ICID2017

Project Members and Sub-groups





- Researchers of RIHN
- Researchers in and on case areas
- Practitioners in case areas
- Practitioners of International organizations

Current Japanese researchers especially for the research n Turkey

Core members

- NAGANO Takanori — Faculty of Agriculture, Kobe University
- NAITO Masanori — Graduate School of Global Studies, Doshisha University
- TAMURA Ulara — Graduate School of Human and Environmental Studies, Kyoto University

Members

- YAMANLAR MIZUNO, Minako
  Graduate School of Intercultural Communication, Ryukoku University

Necessary/possible disciplines of additional researchers

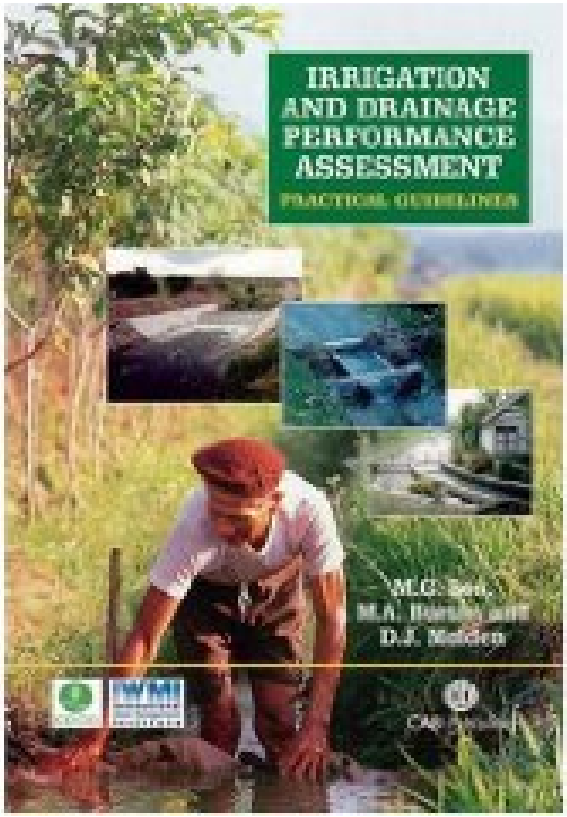
- Crop science
- Economics
- Ecology
- Stock farming

Kick-off Meeting in Turkey

- Objectives: To initiate officially the whole activities of the project
  - To refine the objectives, questions, methods, and expected outcomes
  - To make clear the role and responsibility of the participants and the groups
- Date: July 20(Wed), 21(Thu) and 22(Fri), 2011
- Place: At Harran University, Urfa
- Schedule: Meeting and field visits
  - Harran Plain and higher plain
- Participants: All collaborators
  - Some from Japan, and Indonesia
  - Some from outside of the project, if necessary

IRRIGATION AND DRAINAGE PERFORMANCE ASSESSMENT

PRACTICAL GUIDELINES



Authors :

M.G. Bos, International Institute for Land Reclamation and Improvement (Alterra-ILRI), Wageningen, The Netherlands;

M.A. Burton, ITAD-Water, Hassocks, UK

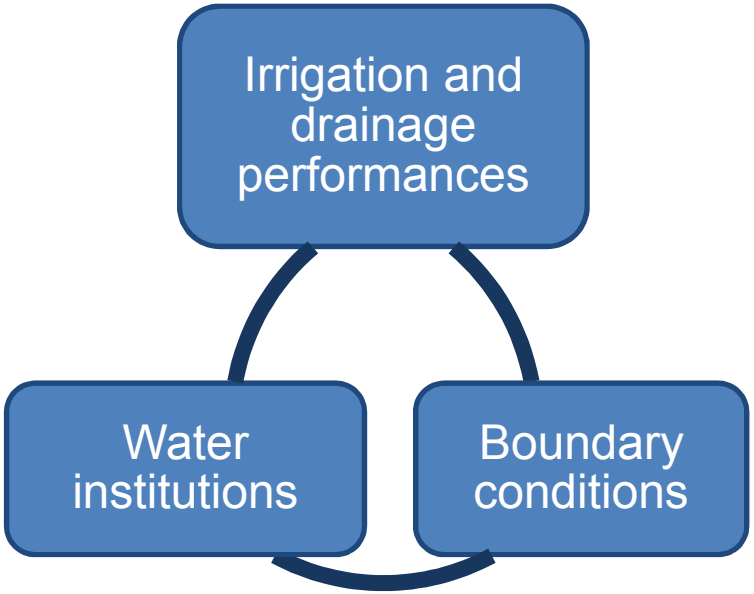
D.J. Molden, International Water Management Institute, Colombo, Sri Lanka

April 2005, 176 Pages,

ISBN 0-85199-967-0

Publisher : CABI Publishing, UK

Price : US$ 75



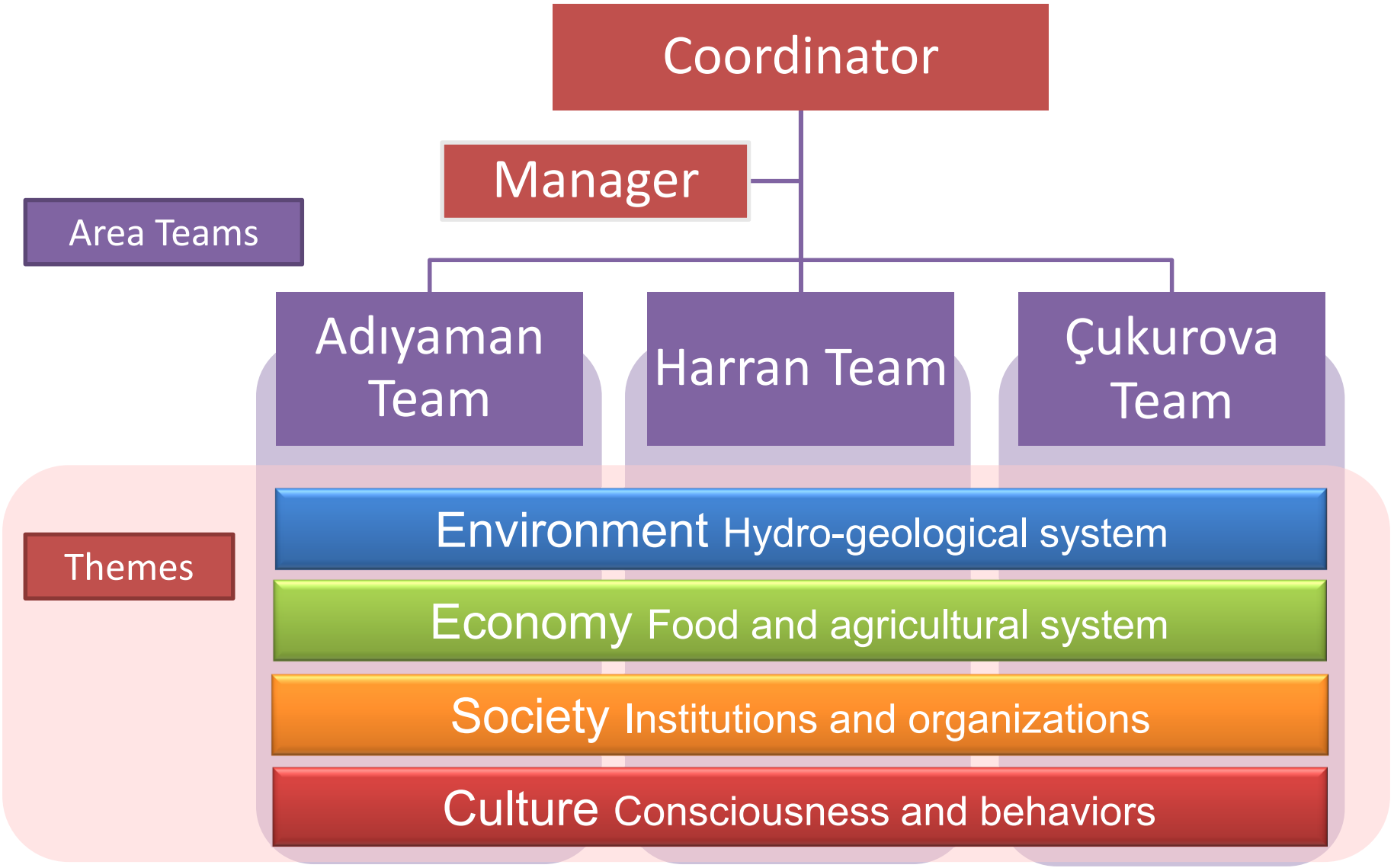
Current Core-members of the project

OKI Taikan	Institute of Industrial Science, the University of Tokyo
MIZUTANI Masakazu	Faculty of Agriculture, Utsunomiya University
TAKARA Kaoru	Disaster Prevention Research Institute, Kyoto University
NAGANO Takanori	Faculty of Agriculture, Kobe University
KAGAMI Haruya	Graduate School of Letters, Kanazawa University
NAITO Masanori	Graduate School of Global Studies, Doshisha University
TAMURA Ulara	Graduate School of Human and Environmental Studies, Kyoto University
GÜNDÜZ, Mustafa	Faculty of Sciences and Letters, Adıyaman University, Turkey
AKCA, Erhan	Faculty of Agriculture, Adıyaman University,
SETIAWAN, Budi	Faculty of Agriculture, Bogor Agricultural University
RAMPISELA ,Agnes	Hasanuddin University, Indonesia
TAKAMIYA Izumi	Faculty of Literature, Arts, and Cultural Studies, Kinki University
MOLDEN, David	International Water Management Institute

Outline of the Project

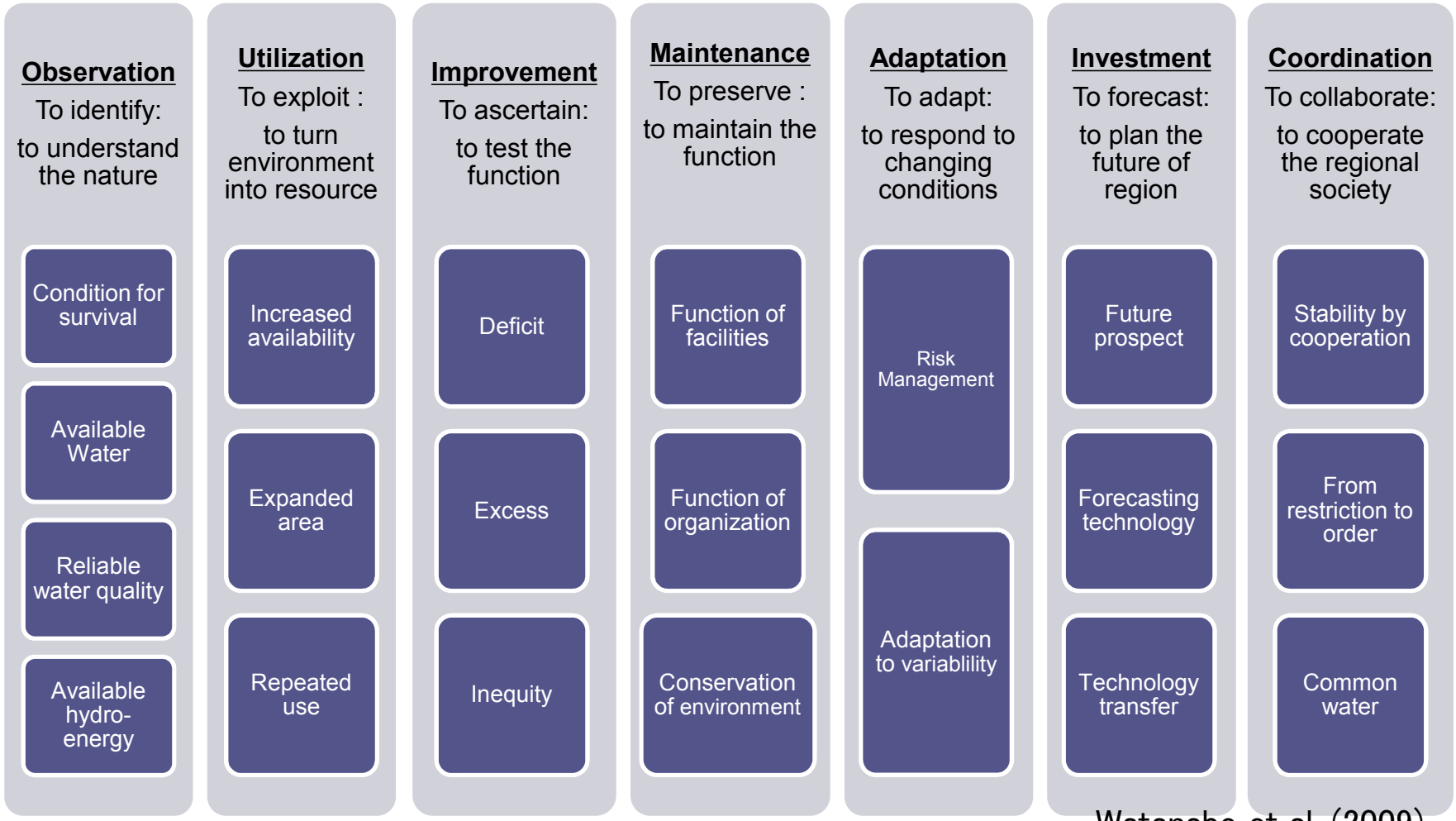
- Period: April 2011 to March 2016
  - JFY Heisei 23th to 27th
- Project Leader: Prof. Tsugihiro WATANABE of RIHN
- Budget: JSY2011 100M JY (USD 1.25M)
  - For the whole activities in all case study areas
  - Including employment of Post-Doc researchers and secretaries
- Budget for JFY2012 and after is uncertain,
  - will probably be decreased
- Utilizing RIHN's scheme for supporting researches
  - Inviting foreign research fellow
- Collaboration with JST-CREST project
- Possible fund raising
  - From JSPS, TÜBITAK and other funding organization
- Collaboration with international organizations
  - Including IWMI, FAO, ICARDA, ICID, etc.

Structure of Turkish Team *(provisional)*



Local Wisdom on water management

- Analysis of the wisdom of each level of management
- Classified elements and integration of them
- Subject, object and function
- Development history
- Interactions, constraints and impacts



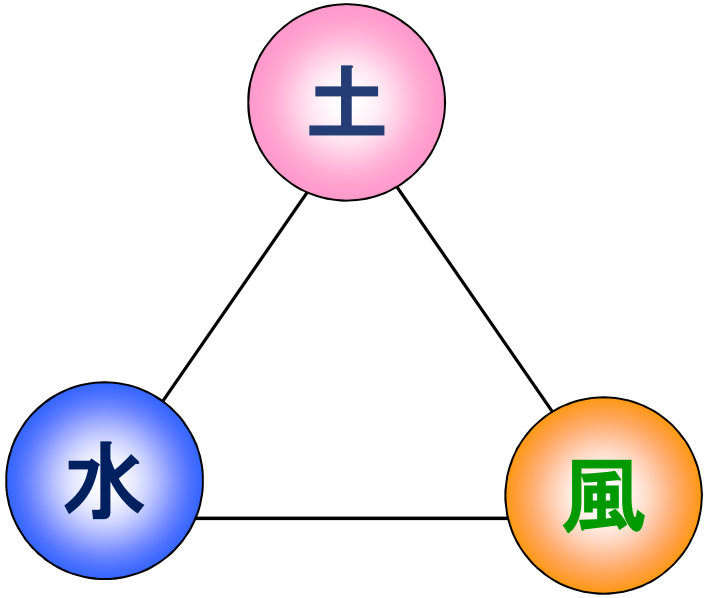
Watanabe et al. (2009)

Research Activities in Turkey 2011-2012

- Organizing the research Team
- Reviewing available resources and references
- Refining the study areas
  - For the precise field studies
- Field studies
  - Geo-hydrological conditions
  - Agriculture and agro-economics
  - Social systems and institutions
    - including lows, EU-system, and WUA
  - Rural life, culture
- Historical review of the Lower Seyhan Irrigation Project
  - Development of irrigation system including management organization
  - Cropping pattern, land use and local economy
  - Environmental impacts

風土・風水・水土

環境を象徴するモノ・コトバ



「風土」・「風水」は分解されない

- ここに風土と呼ぶのはある土地の気候，気象，地質，地味，地形，景観などの総称である。それは古くは水土とも言われている。人間の環境としての自然を地水火風として把捉した古代の自然観がこれらの概念の背後にひそんでいるのであろう。

  和辻哲郎『風土』

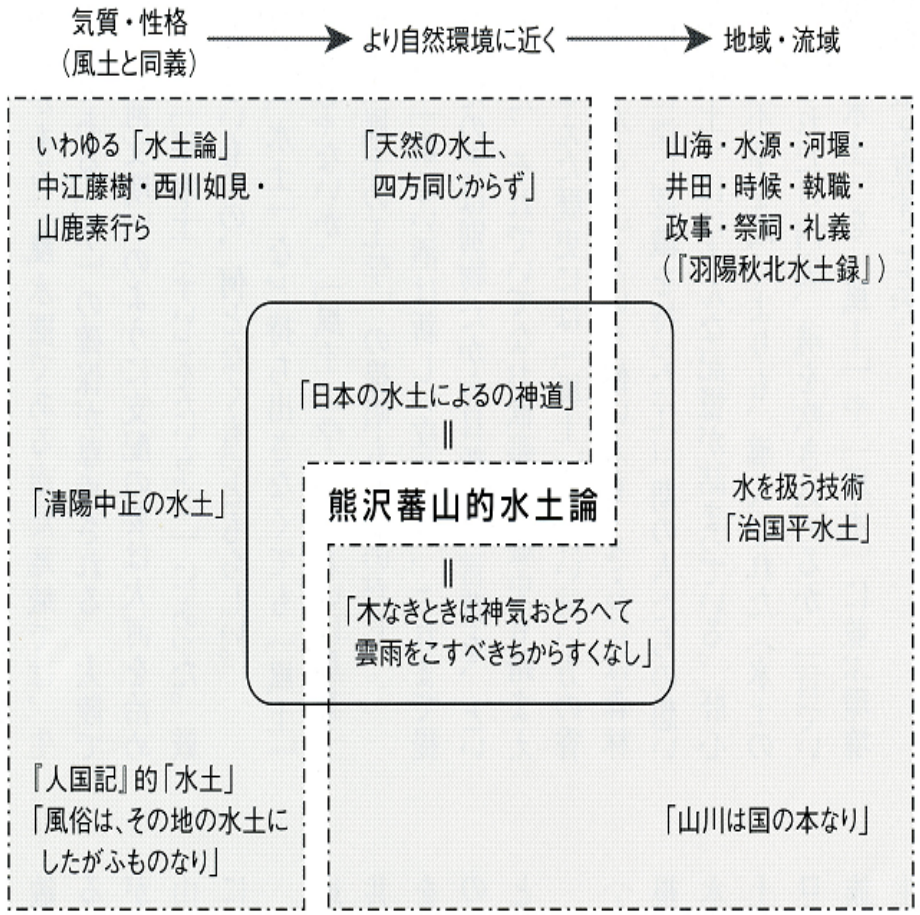
- 水土ハ天地ノ恵徳ナリ。是レ即チ人間活命ノ本ナリ。

  釈浄因『羽陽秋北水土録』

- 山川は天下の源なり。山又川の本なり，古人の心ありてたて置し山沢をきりあらし，一旦の利を貪るものは子孫亡るといへり。諸国共にかくのごとくなれば，天下の本源すでにたつに近し。かくて世中立がたし。天地いまだやぶるべき時にもあらざれば，乗除の理にて，必乱世となることなり。

  熊沢蕃山『集義外書』

近世の「水土」の概念



日本近世の「水土」の概念

わが国で「**水土**」と言うときには、性格を表す「**風土**」に近い使われ方から、自然や人文、景観などが詰まった**地域**や**流域**という実体を表す使われ方まで、けっこう幅広い。

中心に熊沢蕃山を置く。普通の「水土論」は日本を際立たせるが、蕃山は少し違う。日本の水土にふさわしいのは仏教や儒教でなく神道だと言い、森に木を生い茂らせることで「神気」が満ちると言う。とするとその「神」は、自然に宿るアニミズム的な“カミ”になる。それが満ちるという水土は、「**自然環境**」と言い換えることに限りなく近づく。

秋田の僧、釈浄因の水土は広く、挙げられた項目は地表の事象をくまなく描き出す、今で言う地誌に当たる。他に“国”に近い使い方もある。そのクニは農を基礎とし山川が潤す。江戸幕府の出した「諸国山川掟」は、草木根の乱掘禁止、植林の奨励、川筋の焼畑・新田開発抑制を命じて、国土保全思想のひな形となる。

「水土」の“**性格を表す使い方**”と“**実体を表す使い方**”は、分断されているように見えるが、蕃山の水土論が、あからさまには言ってないが、そういう意味で橋渡しをする。

（小長谷・広瀬・渡邉，2008）