Outline of ICHARM and its strategy to contribute to flood disaster reduction

January 11, 2007

Kazuhiko FUKAMI

Hydrologic Engineering Research Team,
ICHARM, Public Works Research Institute
k-fukami@pwri.go.jp

International Centre for Water Hazard and Risk Management

(ICHARM)

under the auspices of UNESCO

List of IHP-UNESCO Centre

Organization	Name	Location(country)
UNESCO-IHE Institute for Water Education		Delft (The Netherlands)
European Regional Centre for Ecohydrology		Lodz (Poland)
IHP-HELP Centre for Water Law, Policy and Science		Dundee (U.K.)
International Centre for Water Hazard and Risk Management	ICHARM	Tsukuba (Japan)
International Centre on Qanats and Historic Hydraulic Structures	ICQHHS	Yazd (Iran)
International Research and Training Centre on Erosion and Sedimentation	IRTCES	Beijing (China)
International Research and Training Centre on Urban Drainage	IRTCUD	Belgrade (Serbia and Montenegro)
Regional Centre on Urban Water Management	RCUWM	Tehran (Iran)
Regional Centre on Urban Water Management for Latin America and the Caribbean		Cali (Colombia)
Regional Centre for Training and Water Studies of Arid and Semi-arid Zones	RCTWS	Cairo (Egypt)
Regional Humid Tropics Hydrology and Water Resources Centre for South-East Asia and the Pacific	HTC Kuala Lumpur	Kuala Lumpur (Malaysia)
Water Centre for Arid and Semi-arid Zones of Latin America and the Caribbean	CAZALAC	La Serena (Chile)
Water Centre for the Humid Tropics of Latin America and the Caribbean	CATHALAC	Panama (Panama)

Objective of ICHARM

- **To function as the global Center of Excellence to provide and assist implementation of best practicable strategies to localities, nations, regions and the world to manage the risk of water related hazards including floods, droughts, land slides, debris flows and water contamination.**
- **At the first stage, the priority is flood-related disasters**

Guiding Principles of ICHARM

- **Needs Driven rather than supply driven**
- **Advocate Integrated Risk Management (avoidance, reduction, transference and acceptance) in multifaceted societal, economical, institutional and cultural conditions as well as technological availability.**
- **Produce Policy Effective Information**
- **Research Development and Capacity Building together**
- **Alliance with all the related organizations and initiatives**

1st Advisory Board Meeting in Tsukuba
(Sept. 15, 2006)

Member list of ICHARM Advisory Board (2006-2008)

Members elected by IHP Intergovernmental Council:

- Group 1 (Western Europe and North America): Mr. Eugene Z. Stakhiv (USA)
- Group 2 (Central and Eastern Europe and Russia): Mr. Maciej Zalewski (Poland)
- Group 3 (Latin America and Caribbean): Mr. Carlos Eduardo Tucci (Brazil)
- Group 4 (Asia and Oceania): Mr. Muhammad Akram Kahlown (Pakistan)
- Group 5a (Africa): Mr. Abou Amani (Niger)
- Group 5b (Arab States): Mr. Anwar George Hanne Jiries (Jordan)

Members appointed by the Chief Executive of PWRI:

- Director General of UNESCO (representative)
- Secretary General (representative), World Meteorological Organization (WMO)
- Director, International Strategy for Disaster Reduction (UN-ISDR)
- Rector, United Nations University (UNU)
- Rector, UNESCO Institute for Water Education (UNESCO-IHE)
- Vice President, Japan International Cooperation Agency (JICA)
- Vice Minister for Technical Affairs, Minister of Land, Infrastructure and Transport


Launch of the International Flood Initiative (IFI) was declared at a session of the UN World Conference on Disaster Reduction in Kobe in January, 2005.
International Strategy
ISDR
for Disaster Reduction
Welcome to Hyogo
World Conference
18-22 January 2005, Kobe, Hyogo,

International Flood Initiative (IFI)

Mission

Promote an integrated approach to flood management

by reducing the risk of social, environmental and economic effects that result in and from floods and increasing the benefits from floods and the use of flood plains

Implementation

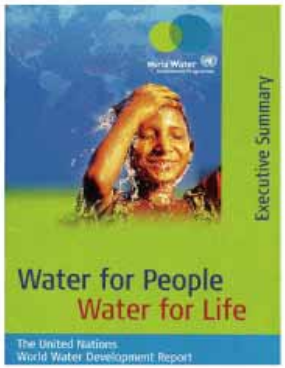
UNESCO, WMO, UNU, UN-ISDR, IAHS ･･･

Secretariat : ICHARM

Asia-Pacific Water Forum (APWF)

http://www.apwf.org

- Launched during the WWF4 in Mexico
- Independent, non-profit, non-partisan, and non-political network
- to contribute to sustainable water management in order to achieve the targets of the MDGs in Asia-Pacific region
- 3 Priority themes
  - Water Financing
  - Disaster Management
  - Water for Development and Ecosystem



UN WWDR(2003)
Executive Summary

Our Web

- Contributing to the World Water Development Report (WWDR) compiled by the World Water Assessment Programme (WWAP) by developing various indicators and presenting case studies in the risk management domain
- Promoting the International Flood Initiative (IFI)
- Expanding the Global Flood Alert System (GFAS) in liaison with the International Flood Network (IFNet)
- Conducting interdisciplinary studies on water-related disaster reduction measures for foreign rivers such as the Mekong River, the Chao Phraya River and the Chang Jiang River
- Developing procedures for hydrological observations and data processing

Research

Data/ Information

Results/ Outcomes

Curriculum

Participation

Information Networking

Knowledge

Network

Training

- Developing database regarding water-related disasters worldwide in various areas such as meteorology, hydorology, damage statuses, and risk management systems
- Creating an international/interdisciplinary network of researchers, administrators and those who completed training courses through the Web and newsletters

- Planning and conducting training for administrators and researchers mainly in developing countries

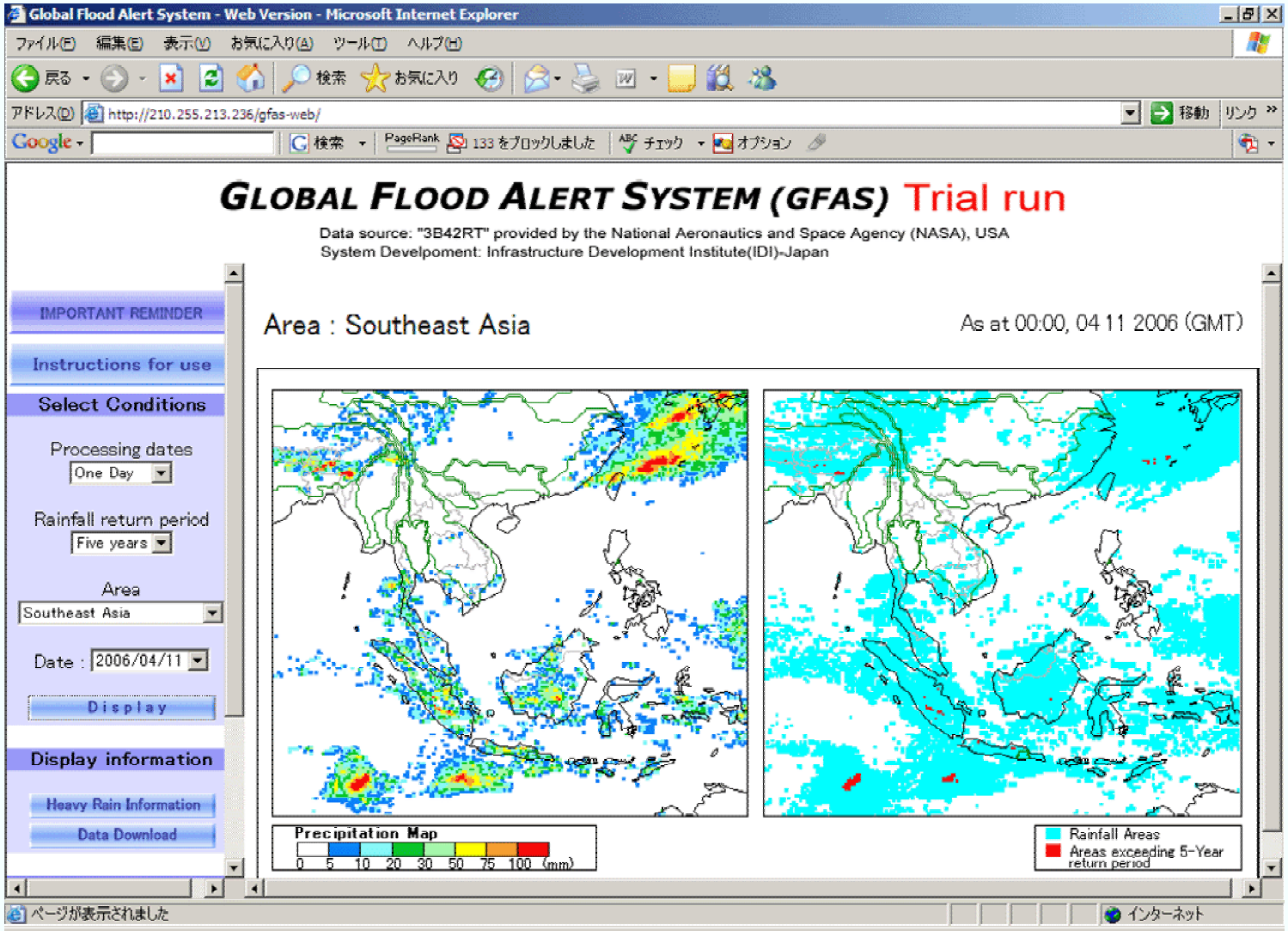
[Examples of the Training Courses]
- Flood hazard mapping
- River and dam engineering
- Tsunami disaster prevention (in preparation)

Research, Training and Information networking activities would be promoted in a combined manner

Research

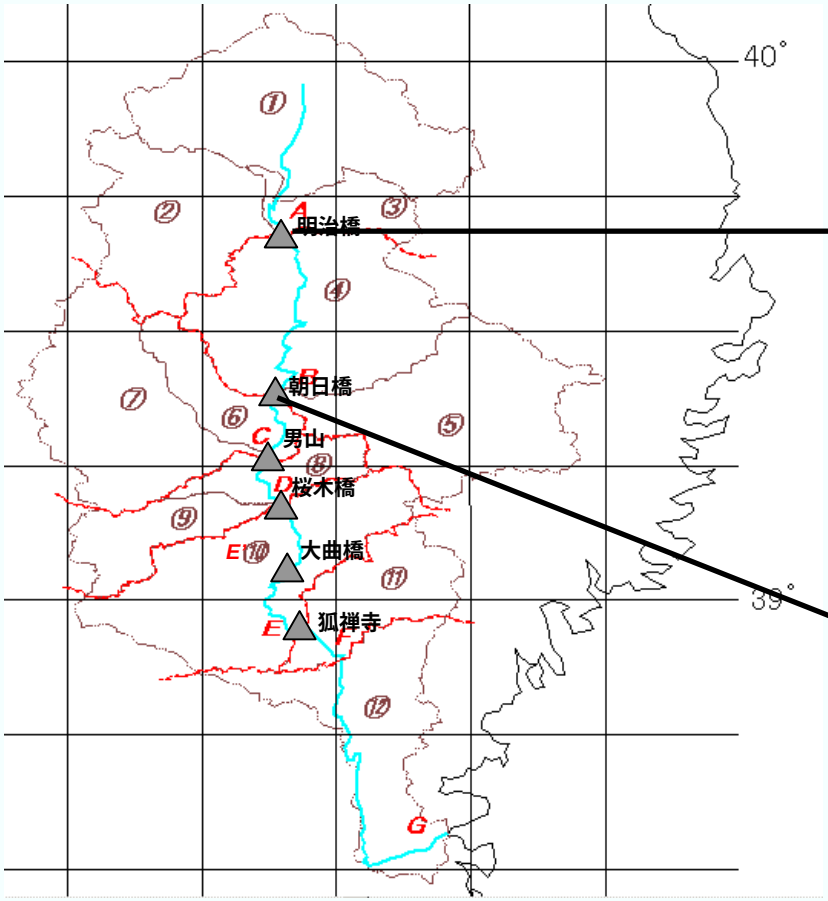
- **Local studies** (Identification of the real needs of the people in diverse localities) → Diagnosis & Prescription
  - ICHARM Local Study Series
  - ICHARM Flood Year Book
- **Satellite-based Flood Forecasting & Warning** (with JAXA, IFNet/GFAS etc.)
- **Flood Hazard Mapping**:
  - methodologies to map in remote localities with poor data
  - effective and beneficial use under different local conditions

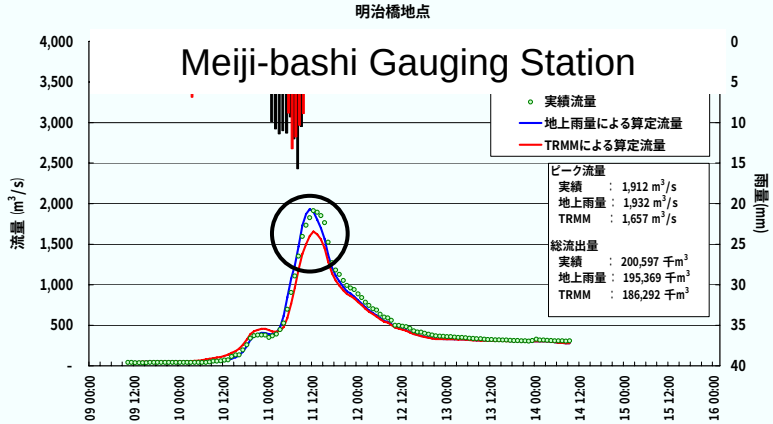
Global Flood Alert System (GFAS)

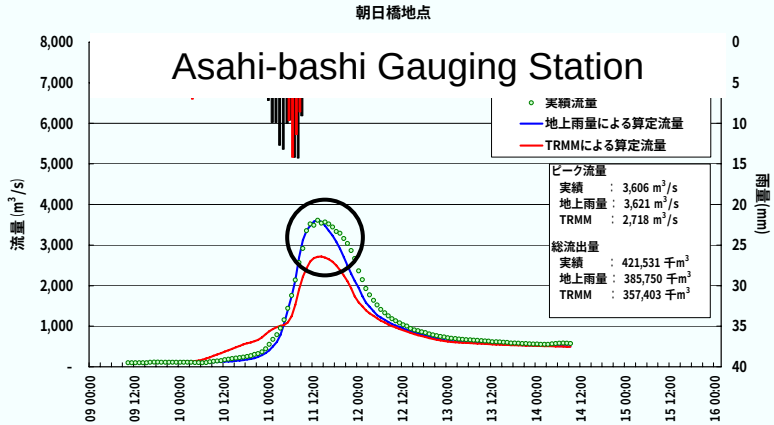


http://gfas.internationalfloodnetwork.org/gfas-web/

Verification of applicability of satellite-based rainfall for flood-runoff analysis

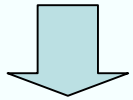






Peak discharges are under-estimated from around 10 to 25%. (dH=0.3-0.8m)
Estimation of arrival time of flood peaks are consistent with real situations.
Errors of total discharges for this event are almost smaller than those of peaks.

A computer software package specifically for flood runoff analyses with GUI using not only ground-based but also satellite-based rainfall data



"*Integrated Flood Analysis System (IFAS)*"

being developed by

Joint research (FY2005-2006) among

ICHARM/PWRI, Infrastructure Development Institute (IDI),

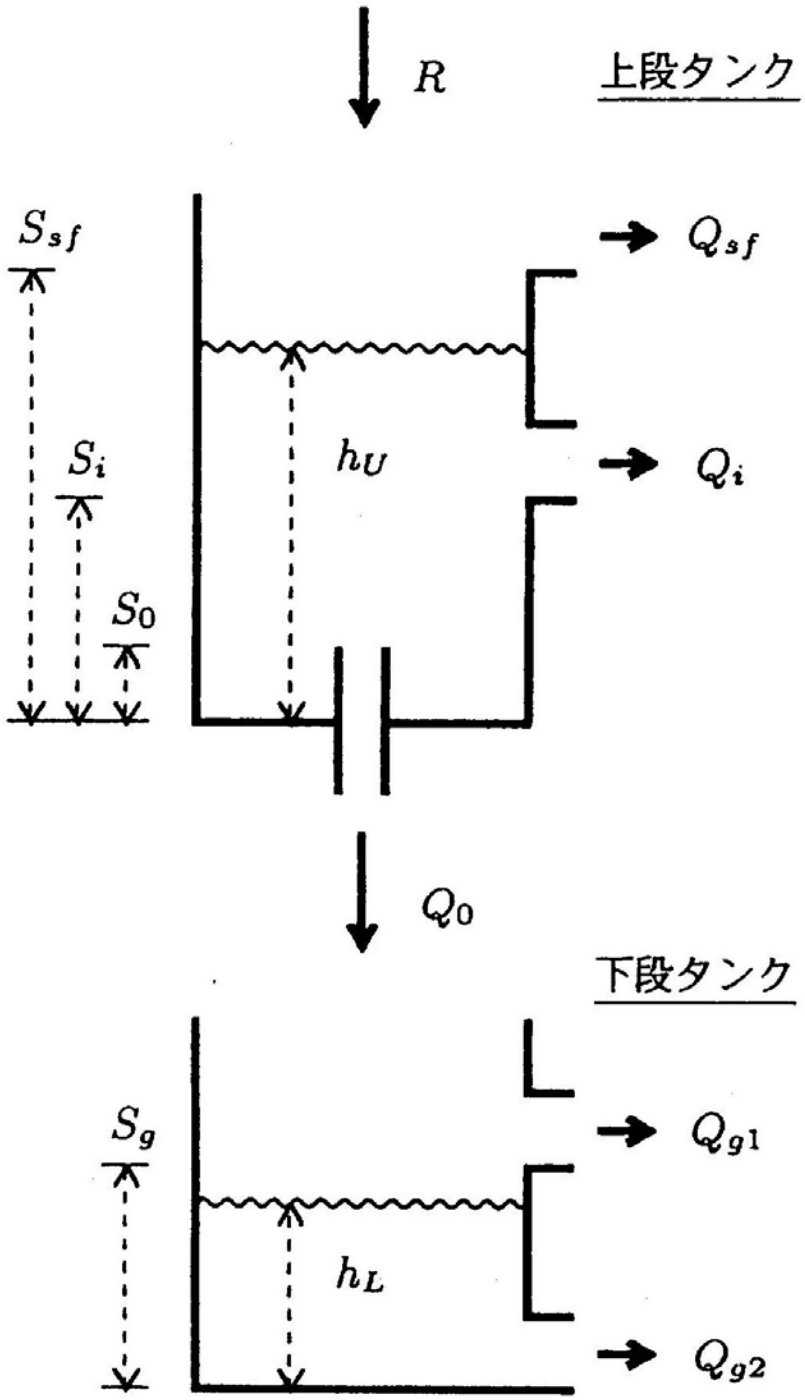
and nine major civil-engineering consulting companies, i.e.,

CTI Engineering Co.,Ltd, NIKKEN Consultants,Inc.,
Yachiyo Engineering Co.,Ltd., Pacific Consultants Co.,Ltd.,
Tokyo Construction Consultants Co.,Ltd., NEWJEC Inc.,
Nippon Koei Co.,Ltd., CTI Engineering International Co.,Ltd.,
& Kokusai Kogyo Co.,Ltd.

ICHARM

Design concept of IFAS

- Availability in poorly-gauged basins
  - Utilization of not only ground-based but also satellite-based rainfall data
  - A default flood runoff calculation model with globally-available GIS
- User-friendly graphical interfaces for data input, analysis & output, but small & light by focusing on flood forecasting and runoff analyses
- Easy & flexible maintenance and upgrade of runoff calculation models
  - A default rainfall-runoff model will be prepared, but any model more suitable for each region can replace it and utilize the common interfaces.
- Distribution of executables, free of charge (plan)



PWRI Conceptual Distributed-Parameter Hydrologic Model (PDHM, Ver.2) by Suzuki et al.(1996)

Upper tank:

Qsf: surface runoff (Manning eq.)

Qi: subsurface runoff (Darcy)

Qo: percolation (Darcy)

Lower tank:

Qg1: Unconfined groundwater runoff

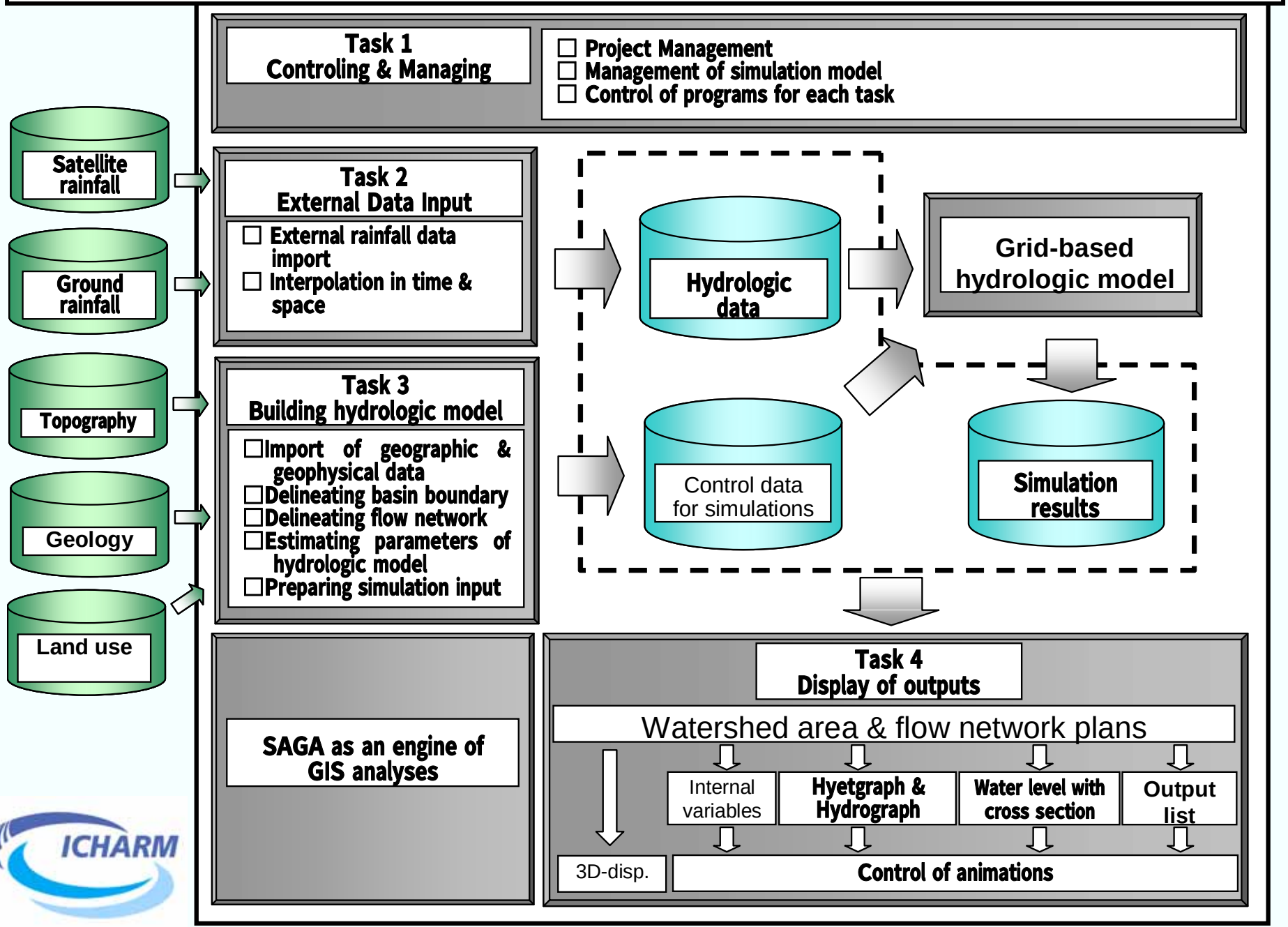
Qg2: Confined groundwater runoff

River routing:

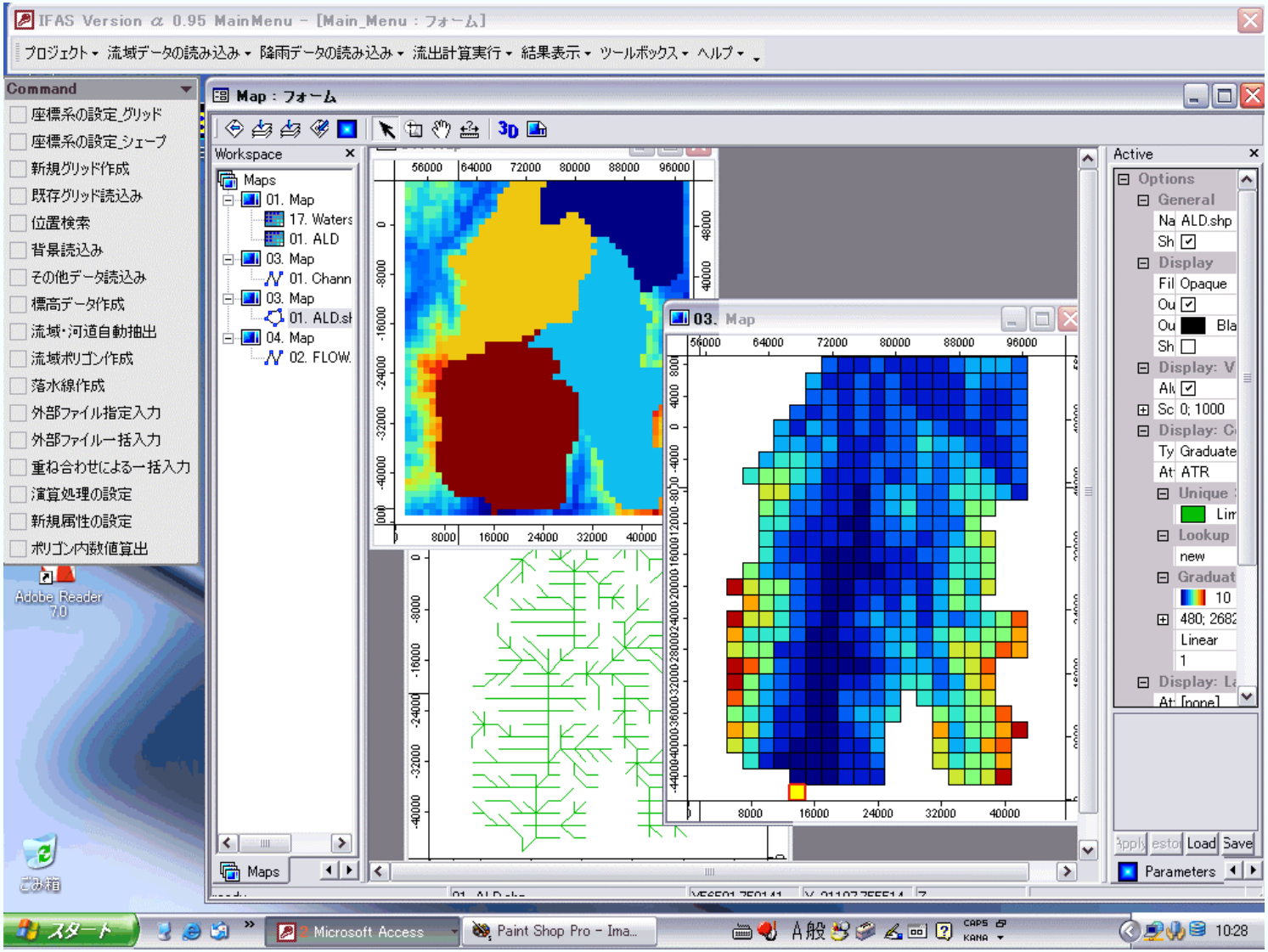
Kinematic-wave method

ICHARM

Structure of Integrated Flood Analysis System (IFAS)



GIS analyses & hydrologic model building (Task 3)



As of alpha-version, August 2006

Information Networking

- **Collection of local site-specific information**
  - **Local Disaster Karte**
- **Emergency response, PCPD (Post crisis and post disaster) program**
- **Analyses of global data sets**

  → **policy effective information**
    - **WWDR ← Flood risks (WWDR2 Chapt 10 Managing Risk)**

Capacity Building

- **Training courses**
  - Flood hazard mapping course started in 2004
  - River and Dam engineering course started in 1969
- **Aftercare program** in trainees local communities
- **Master course on Flood Disaster Mitigation** with National Graduate Institute for Policy Studies (in preparation)

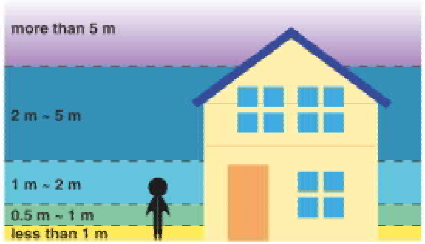
Miyagawa River Flood Hazard Map

[Ise City Flood Evacuation Map]

How to read the map

Anticipated inundation depth
(demarcation according to rank)

- Inundation depth 5 m or more
- Inundation depth less than 5 m
- Inundation depth less than 2 m
- Inundation depth less than 1 m
- Inundation depth less than 0.5 m



Legend

- Evacuation centers
- Disaster prevention organizations
- Flood Fighting storages
- Emergency radio stations
- Sirens

洪水ハザードマップの情報
浸水範囲と浸水深
避難路、避難場所、危険箇所
さらに流向、流速

住民：危険認識、洪水回避のインセンティブ
適切かつ迅速な避難の推進

行政：避難の遂行

20 野村町公民館
5 伊勢市消防署 小俣分署
8 山田赤十字病院
39 厚生中学校
10 東邦ガス(株) 三重支店
61 船江会館
伊勢市消防署 北出張所
4
60 有網小学校
伊勢市消防署 西分署
3
35 伊勢市コミュニティ消防センター
伊勢工業高等学校
59
中島小学校
32
38 厚生小学校
21
22 城田小学校
尾崎咢堂記念館
25
川端水防倉庫
伊勢市福祉
36 健康センター
37 サンライフ伊勢
伊勢市消防本部
2
早修小学校
34
中部電力(株) 伊勢営業所
観光文化会館
42
43 近鉄宇治山田駅
伊勢シティープラザ
40
41
9
24 城田中学校
23 栗野農業研修センター
26 中須農業研修センター
三重県伊勢庁舎
46
47 伊勢市労働
49

Objectives of FHM Training Course at ICHARM

(a) To acquire professional knowledge of hydrology, hydraulics and river engineering necessary to produce flood hazard maps,

(b) To understand the effectiveness of flood hazard maps and how to disseminate and utilize them for people,

(c) To acquire methods to enhance people's capability and promote public awareness to mitigate flood damage,

(d) To acquire an understanding of the way to produce and apply flood hazard maps for participants' own country/region

Thank you very much for your attention!

http://www.icharm.pwri.go.jp/

Fukui City on the left bank side of the Asuwa River (photographed on July 18)

Fukui City on the left bank side of the Asuwa River (photographed on July 18)

ICHARM

UNESCO International Hydrological Programme

PWRI