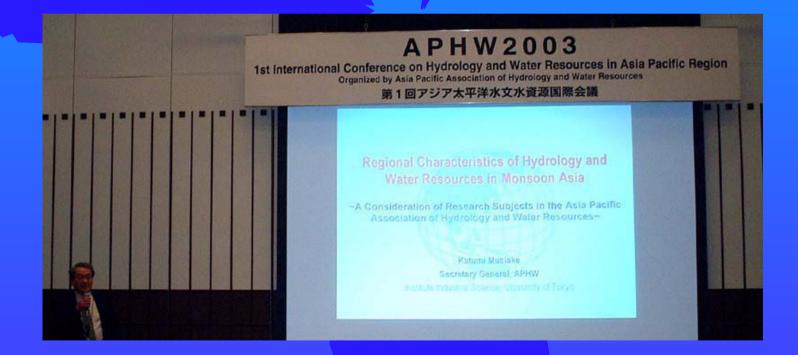
# Geography and Water Budget in Asia Pacific Region

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Primary Purpose: Create a Spatial Framework to discuss about Hydrology & Water Resources 水文・水資源について議論するための空間 的枠組み



# Identity of Asia and Pacific Region アジア太平洋地域の特徴

Asian and Pacific water issues in the world water context

### Virtual Water Forum

Asian and Pacific water issues in the world water context アジア太平洋地域の水問題

の移動 リンク 3

### http://www.cr.chiba-u.jp/ap-vwf/



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### Asian and Pacific water issues in the world water context



### Chairperson Dr.KONDOH, Akihiko and Mr. TAKESHIMA, Makoto

### CONCEPT

Wise water resource management begins with understanding of the regionality. The primary purpose of this session is to demonstrate the region specific water issues, regional hydrology and water resources in Asia Pacific Region. The establishment of the new framework of Hydrology and Water Resources in Asia Pacific Region will be expected in the session. The session will also contribute to the Asia Pacific Association of Hydrology and Water Resources starting in September 2002.

#### POINT OF DESCUSSION

- a) To identify and examine the specific features of hydrology and water resources management in Asia and Pacific region.
- b) To discuss the water issues of the Asia and Pacific region in the context of the world water problems.
- c) To evaluate specific activities or counter measures for water problems found in Asia and Pacific region.

d) To introduce and integrate the results of the relevant thematic sessions in WWF3 on the related topics. e) To share significance and implication of water issue in Asia and Pacific region for fundamentally solving world water problems.



. SUBJECTS

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| SUBJECTS  |
| This page offers materials to discuss about the regional<br>characteristics of Asia and Pacific region  |
| <ul> <li>Hydrology and Water Resources in Monsoon Asia         <ul> <li><u>Wrv do we need to establish the APHS</u> (PowePoint File by Prot. Mushiake, Secretary<br/>General, APHW)</li> <li>Monsoon</li> </ul> </li> </ul>   |
| <ul> <li>Wind asstern by GMS(Himmenic 5)</li> <li>Water Budgets in Asia and the Pacific Resion         <ul> <li>Precipitation and Ar. Temperature in the world. (<u>Clobal Econystem Database</u>)</li> <li>Hydrological Region in Morsoon Asia</li> <li>Climate and Weather</li> </ul> </li> </ul> |
| Annual Tracks of Trackal Ovelones     Dustribution of meanum daily precipitation     Alkylan     Observations of Anian Region "Existence of alkylal lowland"  |
| Old coast lives in Tokyo Oity Japan     Flood     Great Flood in Changliang, Nentiang, and Songhua river, 1998 CHINA     Flood in Makon River     Time changes in invadated area -Monitoring by SPOT/VEGETATION-  |
| Coloration and Read     Tectonic Zone     Annual Environ Rate in the World     Volcano     Distribution in Axian Islands  |
| Island Hydrology     Paddy     Obstribution of Poddy Field in the World     Integrated Watershed Management     Tozumi River Bolin, Japon     Orcandwater   |
| <ul> <li>Water Problem in North China Plain(Japanese FDF) (presented on 1. Nov. 2002 at<br/>Science Council of Japan)</li> </ul>  |
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http://www.or.chiba-u.jp/ap-vwf/subjects.html - Microsoft Internet Explor



# What is the characteristics of Asia and Pacific region?

- Population
- Paddy field
- Climate Monsoon Preci
  - Precipitation Tropical Cyclone
- Geomorphology Tectonic zone
  - Volcano Erosion rate
  - Alluvial lowland
- Disaster
  - Flood, Drought
- Others

Largest Population 世界で最も人口の多い地域 Asia and Pacific region has over 60% of world population.

What sustain such large population?

Gridded Population of the World http://www.ciesin.org/datasets/gpw/globldem.doc.html

## Rice Paddy Field 稲作の存在

Blessing from Alluvial Lowland



Photo by I.Kayane

The map is created from Olson World Ecosystem Classes Version 1.4D.

Paddy rice and associated land mosaics

Najor Paddy Field

Why paddy fields are widely distributed in Monsoon Asia ? **Climatic Factors** - Asian Monsoon

- Tropical Cyclones





**Geomorphic Factors** - Mobile Zone - Volcano

なぜモンスーンアジアに水田が存在するのか?



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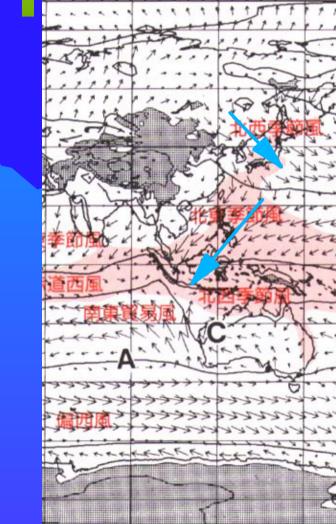
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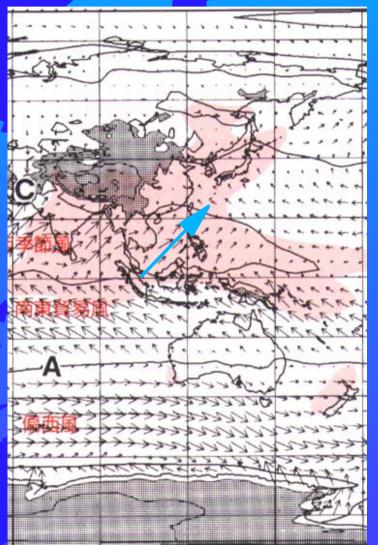
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### Asian Monsoon アジアモンスーン Wind system changing its direction seasonally Wind brings much rain





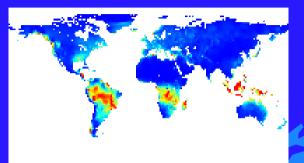
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August

### **Climatic conditions**

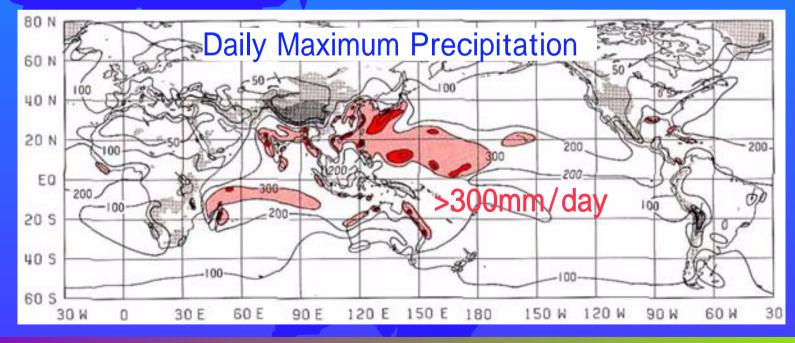
Monsoon, Precipitation, Rainfall intensity



・世界の中で多雨地域
 は三カ所
 ・アジアでは降水強度
 が大きい



### **High Rainfall Intensity**



Matsumoto, J.(1993): Global distribution of daily maximum precipitation. Bull. Dept. Geogr. Univ. Tokyo, 25, 43-48.

Tropical Cyclone Track in 1998

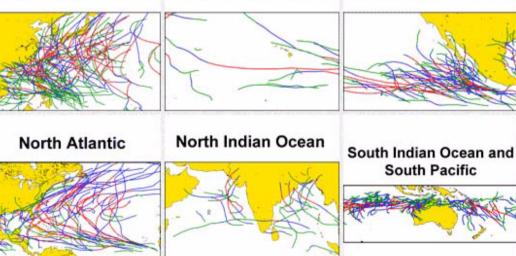


### **Tropical Cyclone** 熱帯低気圧



North Western Pacific North Central Pacific North Eastern Pacific

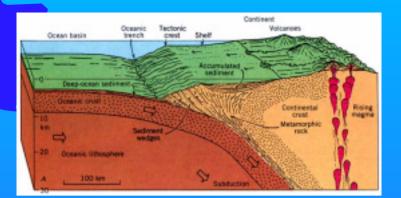
**Tropical Cyclones Database CRL/NASDA** 



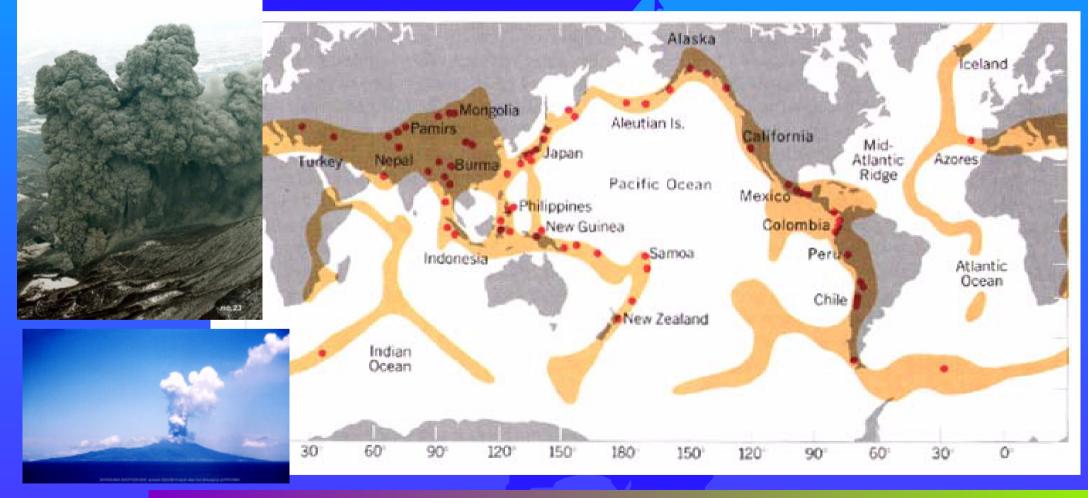
**Common problem in Asia and Pacific Region - Disaster** brought by Tropical Cyclone

### 気候条件だけでは水田の存在 は説明できない Geomorphic conditions

Tectonic zones / Mobile zones



USU VOLCANO 2000/03/31 14:30 by Asia Air Survey co

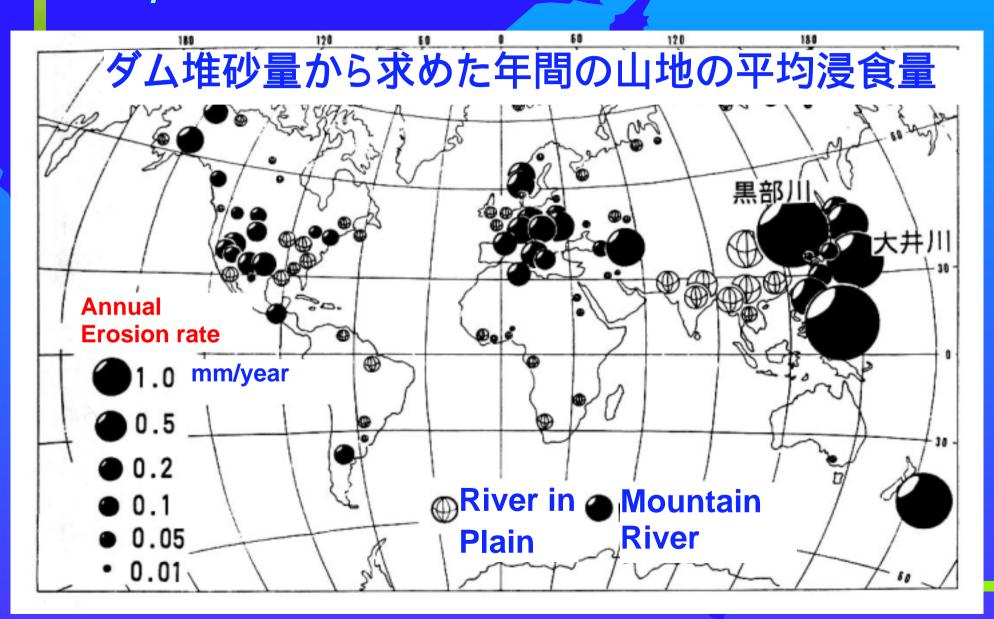


Principal areas of abundant earthquakes(Strahler<sup>2</sup>, 1989)



(Source: TAKAYA,Y. ed. Natural Environment in Southeast Asia, Koubunkan, 1990)

### World Maximum Erosion Rate Precipitation + Tectonic Zone + Volcano



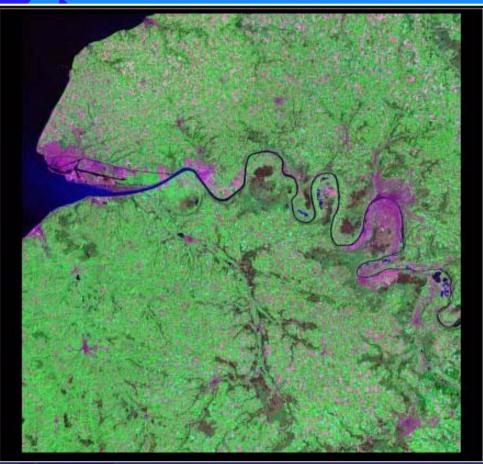
Source) Ohmori, H.(1983): Erosion rates and their relation to vegetation from the viewpoint of world-wide distribution. Bull. Dept. Geogr. Univ. Tokyo, 15, 77-91.

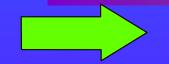
## Alluvial Lowland 沖積低地の形成



Chikugo River: about 2/3 of the watershed is occupied by alluvial lowland

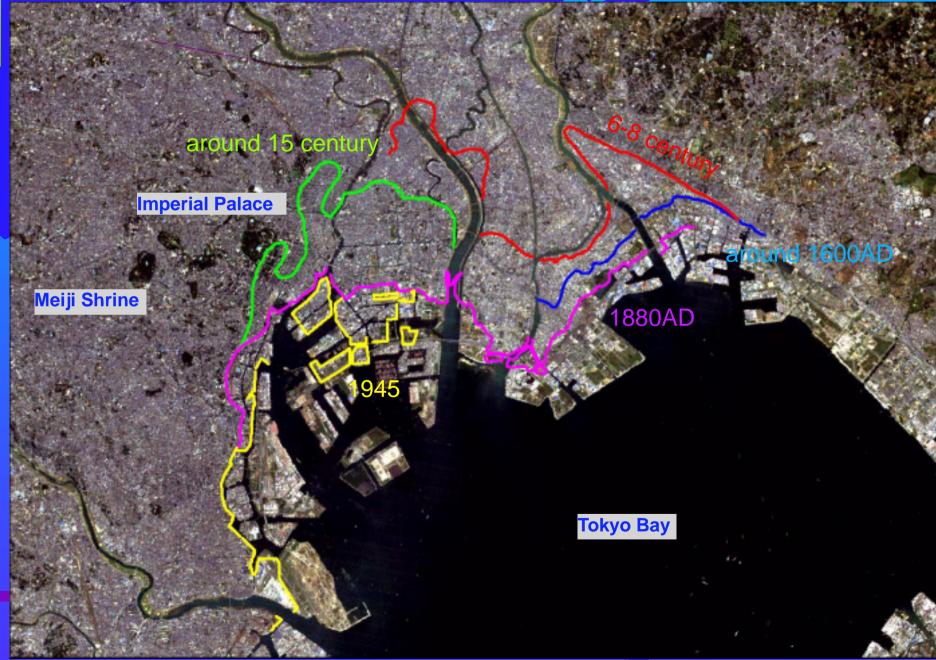
Seine River: the area of alluvial lowland at the river mouth is very narrow





Right Place for Paddy field

# Major part of Tokyo is located on the alluvial lowland



### Land Subsidence, Urban Flood



Amount of subsidence in Nobi Plain, Japan (MLIT, Japan)



**Emerge from the** ground



Zero meter A.S.L.



Common water problem in Alluvial Lowland

# Flood 洪水

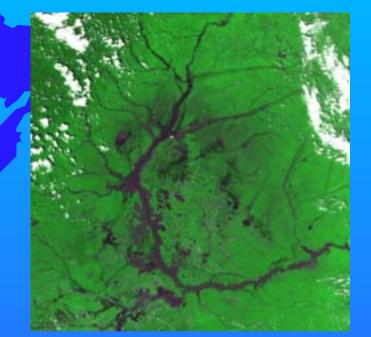
### Submerged house

### 1998 Great Flood in China







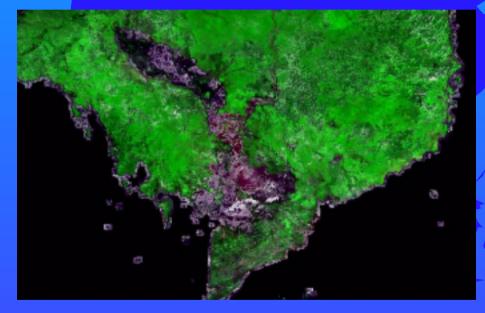


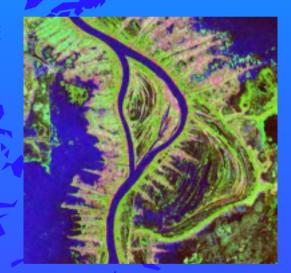




The nature of Asia and Pacific region brings foundation of its prosperity, alluvial lowland, but also sometimes causes disasters.

# Too much water issues





コルマタージュ 灌漑の水路



Mekong flood in 2000 2000年メコン川洪水

colmatage irrigation ditch

Agricultural adaptation and its decay during modernization 農学的適応とその衰退

Spatial Framework to assign regional water problems

ここで、地域の水問題を位置付ける空間的枠組みとしての水文地域図を提案したい

A Map of Hydrological Region An extent with similarity in water budget and its seasonal change Map of Hydrological Region based on the Water Budget 水収支とその季節変動に基づいた 地域区分

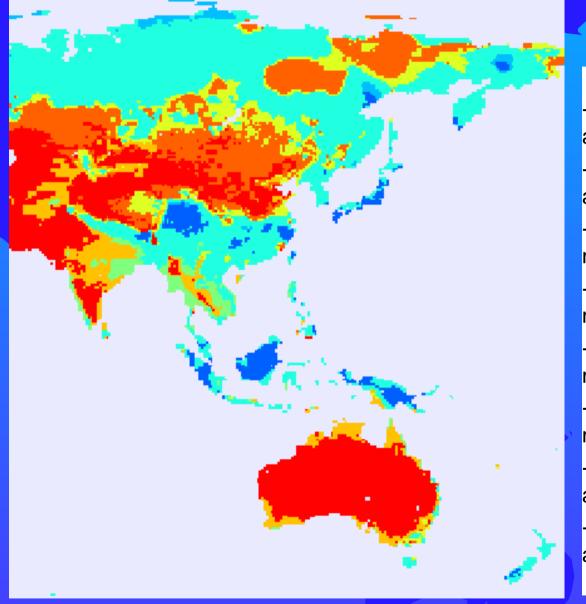
WET

- Region A1: water surplus all year around(ATS>400mm);

- Region A2: water surplus all year around(ATS<400mm);
- Region B1: water surplus with some months deficit (ATD <200 mm);
- Region B2: water surplus with some months deficit (ATD >200 mm);
- Region C1: water deficit with some months surplus (ATD <200 mm);</li>
- Region C2: water deficit with some months surplus (ATD >200 mm).
- Region D1: water deficit all year around (ATD <200 mm);
- Region D2: water deficit all year around (ATD >200 mm);

(ATD: Annual Total Deficit, ATS: Annual Total Surplus)

### Hydrological Region in Monsoon Asia



 Region A1: water surplus all year around(ATS>400mm);

 Region A2: water surplus all year around(ATS<400mm);</li>

 Region B1: water surplus with some months deficit (ATD <200 mm);</li>

 Region B2: water surplus with some months deficit (ATD >200 mm);

 Region C1: water deficit with some months surplus (ATD <200 mm);</li>

- Region C2: water deficit with some months surplus (ATD >200 mm).

 Region D1: water deficit all year around (ATD <200 mm);</li>

 Region D2: water deficit all year around (ATD >200 mm);

Precipitation & Air Temperature : Leemans and Cramer IIASA datasets

### What should be discussed from the map? 水文地域図から何を読み取るか?



region

Adjacency of wet and dry region 乾燥と湿潤が隣り 合っている

湿潤地域に加えて乾燥地域も分布している

**Existence** of arid

Water Problem in Arid and Semi-arid Region

Problems in D region 乾燥地域の問題

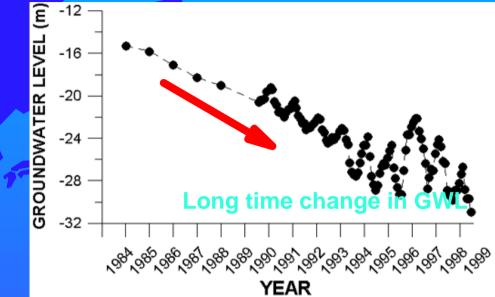
- Disappearance of surface water 断流
- Groundwater level decline 地下水位低下
- Salinization 塩性化
- Other problems その他

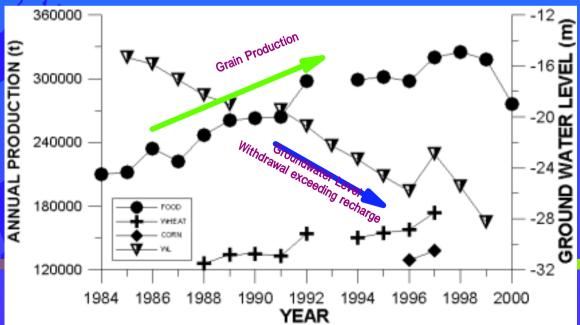


## Water Problem in D Region

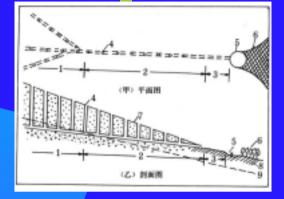


### Decline of Groundwater Level in North China Plain





### Karez in Turfan, Xinjiang, China Groundwater problem with same background





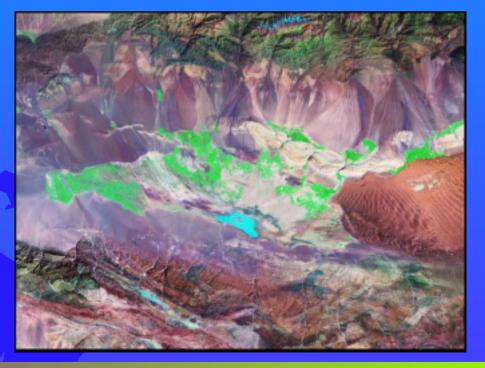
- Water level decline
- Loss of traditional and sustainable technology
- Global warming
- Retreat of glaciers





## Threat from climatic changes

as well as human dimension of water issue



### **Summary on Regional Characteristics**

Monsoon Mobile zone Humid and Arid **Population** 

**Economic activity** 

Islands Mountains

- ....

- Humid and tectonically active zone
- Proximity between wet and humid
- Monsoon and tropical cyclone
- Disaster and blessing of volcano
- Paddy field and its hydrological functions
- Urbanization and related water problems
- Climatic change and its effect to hydrological cycle

・多様性
 ・関連性
 ・空間性
 ・歴史性
 -Diversity - Relationship - Spatial Distribution - History

We set up the spatial framework to tackle with water issues.

## Asia and Pacific Region



### 15 March, 2003 Closing Session of APHW2003 Thank you for your attention!