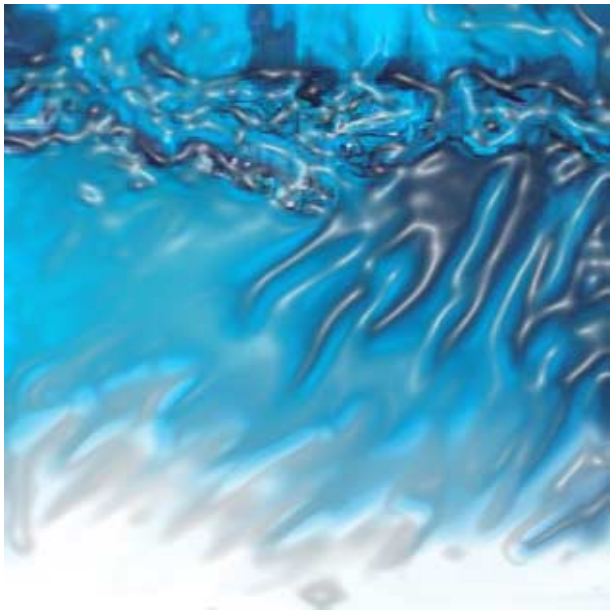
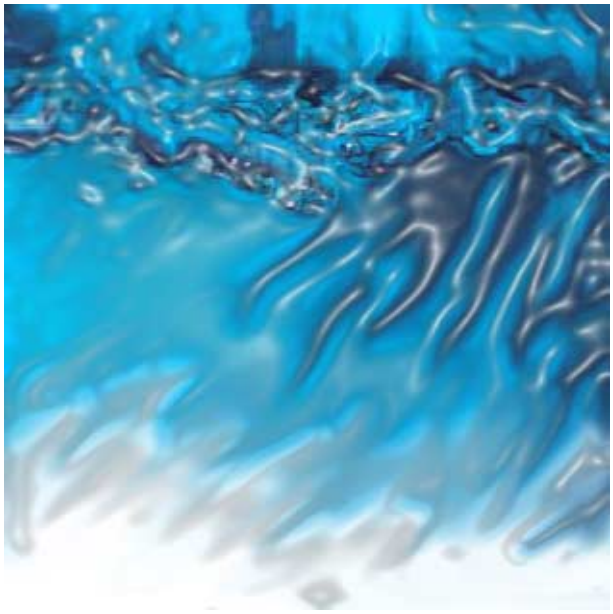
II.　第 3 回世界水フォーラム



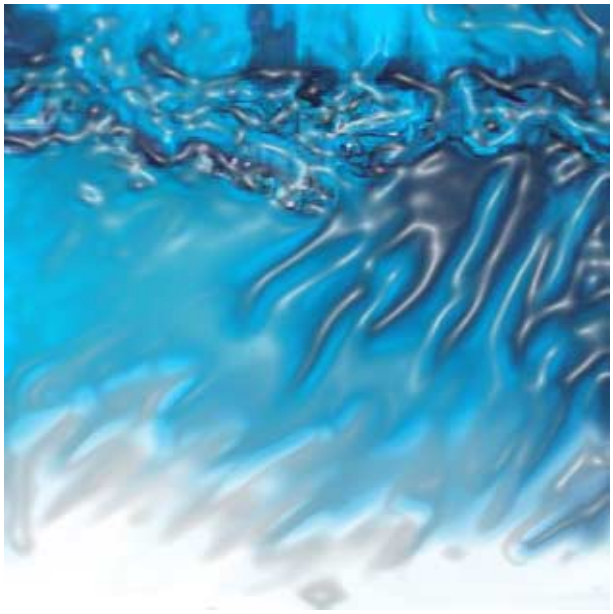
第 2 次水資源プロジェクト研究計画調査

1.　セッション「貧困と洪水」



第 2 次水資源プロジェクト研究計画調査

1.1　主報告書



第 2 次水資源プロジェクト研究計画調査

目　次

1. まえがき

「貧困と洪水」セッションは、洪水テーマのひとつのセッションとして、JICA が ADB と国土交通省と共催で実施したものである。これら三機関は、実施にはあたって、予備的な打ち合わせや事前の 3 回に亘る地域会合、さらに、パネル実施要領や結論案についての度々打ち合わせ協議を行い、2003 年 3 月、京都における第三回世界水フォーラムでの開催を実現した。

JICA は、第三回世界水フォーラム「貧困と洪水」セッション開催にあたって、大井 JICA 国際専門員が議長を務め、また、木邨社会開発調査第二課長がパネリストの一員として参加した。また、同セッションの事例研究 5 件の内、3 件が JICA 実施案件であり、これを各国の JICA カウンターパートが発表した。また、JICA は、準備運営面でも同セッションでの中核的な役割を担い、240 人を超える参加者を集め、同セッションを成功裏に終わらせた。

写真- 1　大井議長

2. 「貧困と洪水」セッションの背景

「貧困と洪水」セッションは洪水テーマの中にあって、第三回世界水フォーラムの主要なテーマである貧困を取り扱った唯一のセッションである。洪水テーマは表- 1 に示す 10 のセッションからなる。

表- 1　　第 3 回世界水フォーラムにおける洪水テーマのセッションと日程

名称	日付	主催組織
オープニング：洪　水 [FLOD-OP]	3 月 18 日 10:00-12:00	国際洪水ネットワーク(IFNet)準備室
土砂問題 [FLOD-04]	3 月 18 日 12:30-15:15	土砂委員会
貧困と洪水 [FLOD-03]	**3 月 18 日 12:30-15:15**	**国土交通省、国際協力事業団(JICA)、アジア開発銀行(ADB)**
都市部における洪水被害の軽減 [FLOD-10]	3 月 18 日 12:30-18:30	Dura Vermeer Group NV/ オランダ水パートナーシップ, Disaster Mitigation Institute
統合的洪水管理 南アジアの人々と洪水、脆弱性 [FLOD-02]	3 月 18 日 12:30-18:30	統合的洪水管理 南アジアの人々と洪水、脆弱性
歴史都市・京都における鴨川の治水対策[FLOD-08]	3 月 18 日 15:45-18:30	京都府
洪水被害の緩和 [FLOD-07]	3 月 18 日 15:45-19:00	「川と水」委員会（IFNet 準備室）
洪水予警報技術 [FLOD-12]	3 月 19 日 8:45-11:30	DHI Water & Environment（デンマーク）
国際洪水ネットワーク(IFNet) [FLOD-13]	3 月 19 日 8:45-11:30	「川と水」委員会（IFNet 準備室）
三角州及び低平地における統合的洪水管理 [FLOD-11]	3 月 19 日 8:45-11:30	オランダ運輸公共事業水管理省
都市部における洪水被害の軽減 [FLOD-10]	3 月 19 日 8:45-11:30	Dura Vermeer Group NV/ オランダ水パートナーシップ, Disaster Mitigation Institute
クロージング：洪　水 [FLOD-WP]	3 月 19 日 12:30-15:10	国際洪水ネットワーク(IFNet)準備室

共催機関のひとつである ADB は、第三回世界水フォーラムに向けて、「Water and Poverty Initiative」という計画を掲げ、洪水問題もその一環として、取り組んできた。これに対して、JICA と国交省は「貧困と洪水」セッションを ADB と共同で主催することで、ADB の「Water and Poverty Initiative」計画に協力してきた。

このため、「貧困と洪水」セッションの準備のために、JICA は ADB 及び国土交通省と共催または協力して、アジア各地で地域会合を実施してきた。その概要を表- 2 に示す。

表- 2　　第三回世界水フォーラムにいたる「貧困と洪水」セッションの経緯

	項目	年月	場所	概要	参加者
1	キックオフ会合	2002 年 2 月	マニラ	ADB が Water & Poverty Initiative の提案と貧困と洪水セッションの初会合	JICA フィリピン事務所対応
2	Water & Poverty 会合	2002 年 5 月	マニラ	ADB が経過報告	JICA フィリピン事務所対応
3	「貧困洪水セッション」打ち合わせ	2002 年 7 月	東京	JICA・ADB・国交省が打ち合わせ、貧困洪水セッションの実施確認	JICA,国交省、ADB、コンサルタントが参加
4	水貧困会合	2002 年 9 月	ダッカ	ADB が主催して、水と貧困に関するケーススタディの発表と討議を行った。JICA も 4 件の案件を発表して協力。	JICA、コンサルタント及び国交省が参加
5	貧困洪水会合	2002 年 10 月	マニラ	JICA が ADB・国交省と共催で実施。JICA、国交省は案件発表、ADB は開催場所を分担。	JICA,ADB、国交省のほか、マニラの関係省庁からの動員。
6	貧困洪水会合	2003 年 1 月	北京	中国国内の各地から参加者。ケーススタディの発表（中国語のみ）	コンサルタント参加
7	貧困洪水会合	2003 年 1 月	ホーチミン	ベトナム各地から参加。ﾌﾞﾚｰﾝｽﾄｰﾐﾝｸﾞに依る討議（ベトナム語のみ）	コンサルタント参加

また、同セッションは、2003 年 3 月 18 日に、京都国際会館 D 号室において、表- 3 に示すプログラムにそって実施された。

表- 3　「貧困と洪水」セッションプログラム (2003 年 3 月 18 日)

時刻	時間	項目	演説者	所属
12:30 – 12:40	10	開会スピーチ	議長	JICA
12:40 – 14:00	80	事例研究発表	発表者	Philippines, Indonesia, Bangladesh, China, Vietnum
14:00 – 14:30	30	パネル討議	パネリスト	MLIT, JICA, ADB, and IWHR
14:30 – 15:00	30	一般討議	一般参加者／パネリスト	
15:00 – 15:15	15	総括	議長	JICA

3. 「貧困と洪水」セッションの概要

3.1. 議長開会スピーチ

「貧困と洪水」セッションは、はじめ、ADB コンサルタントのマーシャル・シルバー氏が同セッションの議長として、JICA 国際専門員の大井英臣氏の紹介で幕を開けた。

冒頭、大井議長は、洪水に対する貧困のもつ脆弱性や洪水の因果関係、洪水が人々の生活に対するの正負の影響を説明した。そして、洪水対策は、それらを考慮して、計画さるべきであること、また、人々が貧困を克服して、洪水に対する脆弱性からに立ち直ることが重要であるとの指摘があった。

さらに、同議長はセッションの目的を以下ようにに示した。

(1) アジアに代表される地形や気候、社会経済、文化的状況をかんがみて、氾濫原における住民への洪水のインパクトをネガティブおよびポジティブな視点から考察する。

(2) 現在の洪水防御及び洪水緩和手法の効果を以下の 4 点に留意して吟味する。
①流域内の天然資源の高度活用、②経済成長の促進、③生活水準の向上、④洪水氾濫エリアと被害リスクの減少

(3) 洪水のネガティブインパクトを緩和し、ポジティブインパクトを増進するために、最もよいアジア地域に限る手法を明らかにする。

(4) 洪水による貧困の軽減という視点から改良した洪水管理の基本的方針を提供する。

(5) 政策策定に関して責任のある地域ネットワーク、および洪水管理と貧困減少のための対策を強化する。

3.2. 事例研究の発表

続いて、フィリピン・インドネシア・バングラデッシュ・中国・ベトナムの五カ国からの、事例研究の発表があった。バングラデッシュの事例研究は、9 月のダッカ「水と貧困」会合

と 10 月のマニラ「貧困と洪水」会合で発表し討議されたものであり、フィリピンとインドネシアの事例研究は 10 月のマニラ「貧困と洪水」会合において発表・討議を経たものである。また、中国とベトナムからの事例研究は、それぞれ 1 月に北京とホーチミンにおいて開催された「貧困と洪水」会合を経て、今回の発表に至ったものである。

各事例研究発表の概要は次のとおりである。

(1) Flood Damage Restoration Works with Structures in Ormoc City, the Philippines（発表者：Bernardo P. AMAN 氏、OIC-Project Manager Project Management Office for Major Flood Control Projects, Department of Public Works and Highways）

1991 年 11 月 5 日にフィリピン国オルモック市を襲った台風による洪水は 8000 人もの尊い人命を奪うと同時に、地域社会・経済に甚大な被害をもたらした。JICA は、この甚大な災害を二度と繰り返さないために、無償協力による復旧事業を実施した。本事例研究は、この復旧事業によって建設された堤防や砂防施設が、災害防止に大きく貢献すると共に、オルモック市の移転計画や構造物の維持管理がスムーズに実施されていることが、同事業効果を更に大きく高め、これまで川沿いの洪水地帯に住んでいた貧困層の人々の生活改善に大きく貢献していることを紹介した。

(2) Sustainable Management of the Brantas River Basin in Indonsia (発表者：A. Rusfandi USMAN 氏、 Lecturer on Water Resources Development The Brawijaya University)

インドネシア国ブランタス流域開発は、JICA をはじめとする日本の支援によって実施されてきた。この流域開発事業は 1960 年代の洪水調節事業に端を発し、かんがい、水供給・水力発電を含めた総合開発事業として、地域社会・経済に発展してきた。本事例研究は、ブランタス事業の成功は、事業当初から、ひとつの河川にひとつの計画とひとつの経営体という思想に基づいて、実施から管理・運営がなされてきたことにあることや、地域経済社会の発展が貧困削減に貢献してきたことを紹介するものである。

(3) Flood Proofing and Livelihood Improvement in Bangladesh（Md. Zahangir ALAM 氏、 Project Director Local Government Engineering Department）

JICA は、バングラデッシュ国チャ-ル、ハオール地域にすむ住民（ 150 万人）を対象として、洪水被害を最小限に止めつつ、同地域の生計向上を図ることを目的として、計画調査を実施した。本案件は、洪水対策として、洪水に適用した構造物対策と（Flood Proofing）と洪水に対する脆弱性から人々の生活を守るための生計向上計画という 2 つの要素をもつ計画である。本事例研究では、Flood Proofing の考え方による住居や公共施設の嵩上げや、生計向上計画の考え方による健康と栄養教育を目的とした家庭菜園の推進、家禽の推進、手工芸技術の向上、養蚕推進を目的とした桑木植樹、生計向上について発表し、このような洪水対策手法は、これまで対策の手が及ばなかった地域の貧困層の洪水被害を軽減し、貧困削減に貢献することを示した。

(4) Lessons Learned from Operation of Flood Detention Basins in China （HUANG Jinchi、Director Flood & Drought Mitigation Center, China National Institute of Water Resources and Hydro Power Research (IWHR)）

中国では、これまでのような堤防に頼る洪水対策が、維持管理費の増大が国庫負担に重く圧し掛ってきていることから、いろいろな代替手段を講じている。黄河周辺においては、かつて堤防で守ることで開発してきた農地に、一定規模以上の洪水を水門から水を引き込み、下流への洪水逓減効果をもつ遊水池化する計画を進めている。この計画は、併せて、対象農地を遊水池となることを前提に、多角的な農業経営を進めている。本事例研究は、このような洪水を許容して、それに、適用する農業経営が、貧困削減にも軽減することを示した。

(5) Living with Floods in the Mekong River Delta of Viet Nam（発表者：DANG Quang Tinh 氏、Chairman, Standing Office, Central Committee for Flood and Storm Control, Ministry of Agriculture and Rural Development 及び：PHAM Thanh Hang 氏、Programme Officer, Social Equity and Environmental Sustainability Unit United Nations Development Programme）

ベトナムにおいても、中国と似たような事情、すなわち、長大な堤防の維持管理のための費用が増大することや広大なメコンデルタに延々と堤防を築くことが非現実的であることから、「Living with Flood」という思想を掲げている。この考えは、バングラデッシュの事例研究が示した Flood Proofing と中国の事例研究の考え方と共通するものである。本事例研究においては、このような考え方はベトナムの農村地帯の貧困層に対する生計向上に貢献することを示した。

3.3. パネル討議

パネル討議は、以下に示すパネリストが、おのおのの所属機関の方針やパネリストの経験に基づいて、貧困と洪水についての見識を示した。

	氏名	職務	所属
1	前田俊一	JICA Expert for Water Resources Policy	国土交通省
2	木邨洗一	Director	JICA
3	Ian B. FOX	Principal Project Specialist	ADB
4	CHENG Xiaotao	Director	Institute of Water Resources and Hydropower Research (IWHR)

パネル討議において、提起された意見や考えは次のとおりである。

- 湿地帯に排水路など構造物を設置することで、より生産性の高い土地利用を促進し、社会経済の発展に貢献している事例の紹介により、構造物による洪水対策が貧困削減に貢献してきている。
- 中国やベトナムでの事例を生かして、洪水がもたらすプラスの便益を保全することで、貧困削減に貢献できる。
- 地域によって、洪水対策のよく実施されている地域とそうでない地域とがあり、そのギャップが貧富の差となって現れている。貧困削減のためには、こうようなギャップ

をできるだけ小さくする洪水対策の促進がひつようである。

また、同パネル討議において、JICA 木邨洗一氏より、プロアアな事業推進にあたって、次のような事項の指摘があった。

- 事業採択にあたっては貧困対策を目的とする事業を優先する。
- 事業形成から実施の段階に至るまでの過程で、より貧困層の参加を促進する。
- 貧困層が最大の便益を得るような事業を促進する。

写真- 2　パネル討議の様子写真

写真- 3　ほぼ満席状態の第三回世界水フォーラム「貧困と洪水」セッション

3.4. 質疑応答

質疑応答において、一般参加者から、貧困と洪水の係りについて多くの有益な意見が出された。その中から次回の世界水フォーラムに向けての行動など、いくつかの意見は、セッションの結論に取り入れられて、セッション報告書として、洪水総会に報告された。

次に質疑応答の概要を以下に示す。

表-4　貧困と洪水セッションにおける主な質疑応答

- 洪水氾濫域の土地利用規制をこのセッションの結論に取り入れて欲しい。
- 次回の世界水フォーラムに向けて、どれだけ貧困を引き起こす洪水を軽減できるかが今後の課題である。
- 適切な情報収集によって、貧困層に関する洪水の経済影響を分類・定量化することが重要である。
- 参加型アプローチが事業推進の基本である。貧困層が洪水の計画段階から事業実施、運営の段階に参加する必要がある。
- 洪水の頻度や程度を高めている原因について言及されるべきである。
- 非構造物対策が構造物対策以上に強調されるべきである。
- 貧困層にとって、洪水の生物学的影響についての知識が重要な課題である。
- 設計・建設・操作・維持管理に草の根レベルの能力開発が必要。

3.5. セッションまとめ

最後に、大井議長より、同セッションのまとめが、次のように提案された。

- 貧困軽減をより進めるため、事業選定に際し優先度を決める基準に貧困軽減を加える。
- 事業実施に伴う貧困層への便益の最大化と悪影響の最小化を図るため、事業に係わる意思決定をする際には、貧困層の意見を反映させる。
- 貧困層に対し最大限の事業効果をもたらすため、生計向上、雇用創出、貧困層に対するその他の配慮、などを事業計画段階から検討する。
- 洪水常襲地域の状況を反映させて事業計画を策定する。つまり、優先度の高い地域にはハイスタンダードの洪水防御計画を策定し、その他の地域に対しては、農業や漁業など洪水氾濫による便益を重視し生計支援を中心に行う。
- さらに、都市部あるいは人口密度の高い開発地域には、ハイスタンダードの洪水防御計画を策定し、他の地域には、氾濫による便益を最大限に活用するため、flood proofingによる比較的限られた防御方法を適用する。
- 規模の小さい洪水に対しては地域の伝統的対策を活用するよう検討する。
- 洪水に対する脆弱性の分析は、洪水の軽減と管理計画を準備・実施する段階から始める。
- 多くの国で洪水に対する脆弱性が増加しているので、地域特性に配慮した多用な治水対策を検討し、治水への予算を増加させる。

4. 洪水総会に対するセッション報告

「貧困と洪水」セッション終了後、同セッション共催者 JICA、ADB 及び国土交通省の協議によって、洪水総会に対する同セッション報告書が作成された。

セッション報告書は、第三回世界水フォーラム事務局へ提出するフォームにそったものと、洪水総会での発表用パワーポイント版の二種類が作成されたが、内容は同一である。

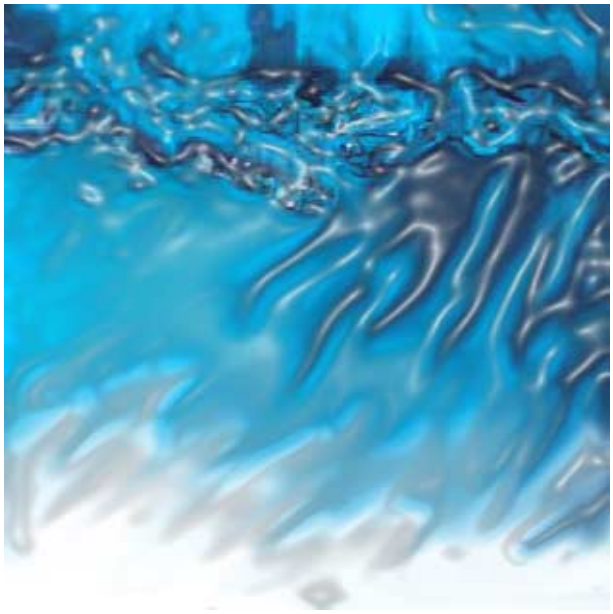
同セッション報告書は、ADB コンサルトントの Marshall Silver 氏が洪水総会に発表した。

総会での意見も反映した「貧困と洪水」セッション報告書は次のように作成された。

表-5　セッション報告書

1. セッションの主な課題
   - 頻発する洪水は、貧困層にもっとも厳しく影響している。
   - 貧困層の洪水に対する脆弱性は、洪水氾濫域における人口増や環境破壊により、増大傾向にある。
   - 発展途上国の洪水対策は限られたリソースと限りない必要性とによって制限されてきた。
   - したがって、貧困層の脆弱性は益々進行し、貧困は悪化し、社会経済発展を妨げている。
2. セッションにおいて検討された主な点
   - 洪水の正と負のインパクトに対して、その土地柄に根付いた「Living with Floods」に学ぶ。
   - 適切な情報収集が貧困層へのインパクトを定量化する。
   - 設計・建設・操作・維持管理に草の根レベルの能力開発が必要。
   - 能力開発・洪水保険や維持管理など洪水に対する総合的備え（Preparedness）が必要。適切な構造物建設と非構造物対策が必要。
   - 次回の世界水フォーラムに向けて、どれだけ貧困を引き起こす洪水を軽減できるか。
3. 結論
   - 貧困軽減をより進めるため、事業選定に際し、優先度を決める基準に貧困軽減を加える。
   - 事業実施に伴う貧困層への便益の最大化と悪影響の最小化を図るため、事業に係わる意思決定をする際には、貧困層の意見を反映させる貧困層に対し最大限の事業効果をもたらすため、生計向上、雇用創出、貧困層に対するその他の配慮、などを事業計画段階から検討する。
   - 対象地域ごとの異なる条件によって、異なるアプローチが必要：高い優先度の地域には高い基準を、一方、他の地域には、生計の根幹部を守り、氾濫による便益を最大限に活用するため対策方法を適用する。
   - 多くの国で洪水に対する脆弱性が増加していることから、地域特性に配慮した多用な治水対策を検討し、治水への予算を増加させる。

1.2　発表資料



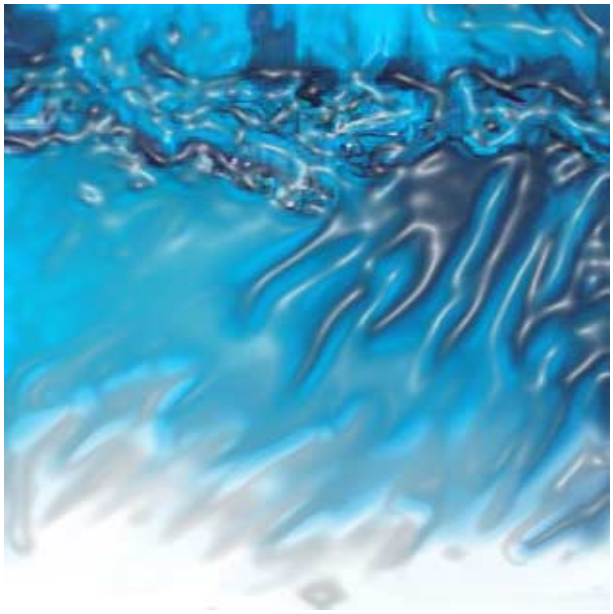
第 2 次水資源プロジェクト研究計画調査

(1)　議長冒頭挨拶

Chairman's Speech

Mr. Hidetomi OI

Senior Advisor,
Institute for International Cooperation, JICA,
Japan



第 2 次水資源プロジェクト研究計画調査

Session: "POVERTY AND FLOODS"
in the Cross-Cutting Issue of "Floods"

Organized and Sponsored
By

Ministry of Land, Infrastructure and Transportation, Japan (MLIT)
Japan International Cooperation Agency (JICA)
Asian Development Bank (ADB)

Session Purposes

To formulate appropriate means of reducing vulnerability of the poor to floods by learning lessons from:

- Regional Workshops : Bangladesh, the Philippines, China and Vietnam
- Case studies : Philippines, Indonesia, Bangladesh, China and Vietnam

Objectives of the Session

"Poverty and Floods" session, one of the 13 sessions under the issue of "FLOODS", has the following objectives:

. To examine the impacts of floods, both positive and negative;
. To examine the effectiveness of current flood protection and mitigation measures; .
. To identify the best practices;
. To provide basic concept for improved flood management with a view to reducing the vulnerability of the poor to floods; and
. To strengthen regional networks

Operation Plan of the Session

1) Presentation of 5 Case Studies in the Philippines, Indonesia, Bangladesh, China, and Viet Num.
2) Panel Discussion
3) Q&A and General Discussion
4) Wrap Up

Session Title: <2-8-7> Poverty and Floods

Submission Flow of Session Statement

"Poverty and Floods" Session Statement

↓

"Floods" Wrap Up Session

↓

WWF3 Secretariat

↓

Ministerial Conference

5

Session Title: <2-8-7> Poverty and Floods

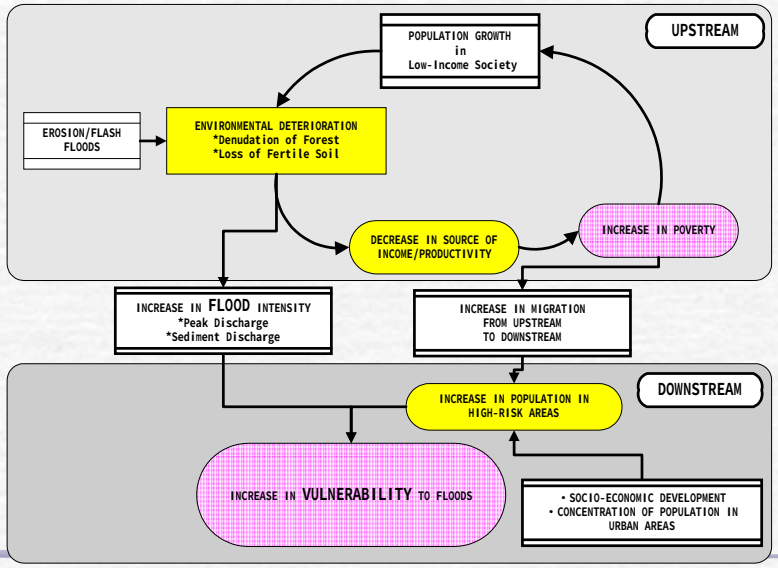
Regional Workshops

WORKSHOP	DATE	VENUE	SUMMARY OF OUTCOMES
Asia-Pacific Regional Consultation Workshop On Water and Poverty	22 – 26 September 2002	Dhaka, Bangladesh	• In applying the existing policies/strategies, focus should be on reducing impact of floods on the poor. • In adopting new policies/strategies, their impact on the poor should be assessed and considered. • All stakeholders including the poor and women should be involved in all development projects. • Flood Proofing with Livelihood Improvement can be a model for the pro-poor approach which aims at poverty reduction through variety of activities to be proposed based on socio-economic survey on flood - poverty linkage
Regional Consultation Workshop on Poverty and Floods	17-18 October 2002	Manila, Philippines,	• Traditional FMM have been effective for poverty reduction. However, flood loss/damage is increasing as vulnerability increases by concentration of population especially the poor in areas at risk • FMM should be more effective through integrated approach (hard + soft, flood mitigation + water use + environment conservation) with the basin as a unit. • FMM should be more pro-poor through inclusion of poverty reduction components, targeting poorer societies, and conducting social/economic survey prior to project planning.
Asia-Pacific Regional Workshops on Poverty, Floods, and Gender: National Consultation on the Impact of Floods, Drought, and Other Water Disasters on the Poor	9-11 January 2003	Beijing, People's Republic of China,	• Floods Mitigation Should be Consistent With Aqua-Agricultural Development • Flood Proofing is Very Effective Measure for Farmland Flood Management. • There is potential to develop effective and affordable flood damage insurance for crops and property,
Asia-Pacific Regional Workshops on Poverty, Floods, and Gender: National Consultation on the Impact of Floods, Drought, and Other Water Disasters on the Poor in Viet Nam's Mekong Delta	20-22 January 2003	Ho Chi Minh City, Viet Nam,	• "Living with floods" can be a basic principle for flood risk reduction and poverty alleviation in areas like Mekong Delta where deep and extended flooding is a perennial phenomenon, to minimize the negative impact and maximize the positive impact of flood.

6

Session Title: <2-8-7> Poverty and Floods

INCREASE IN VULNERABILITY TO FLOODS



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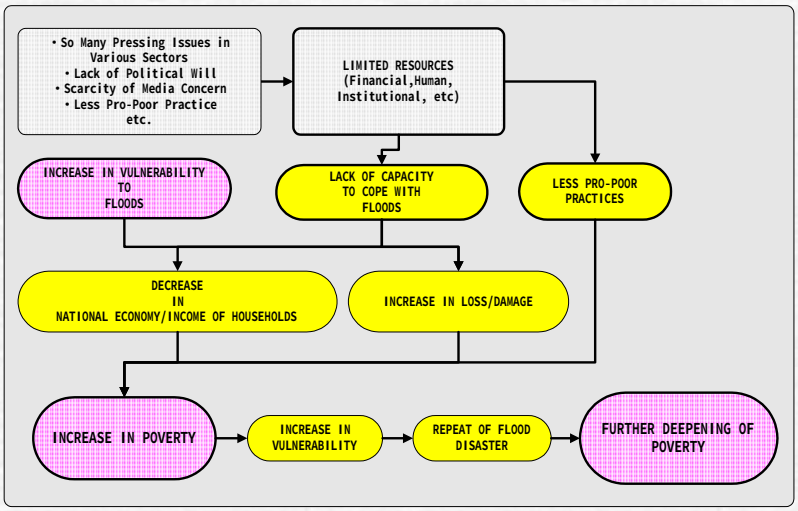
Session Title: <2-8-7> Poverty and Floods

FLOODS – VULNERABILITY – POVERTY LINKAGE



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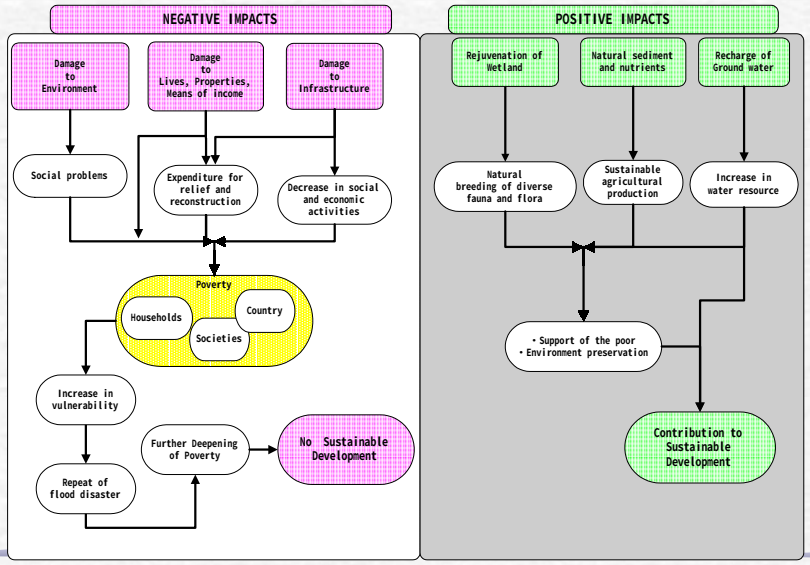
Session Title: <2-8-7> Poverty and Floods

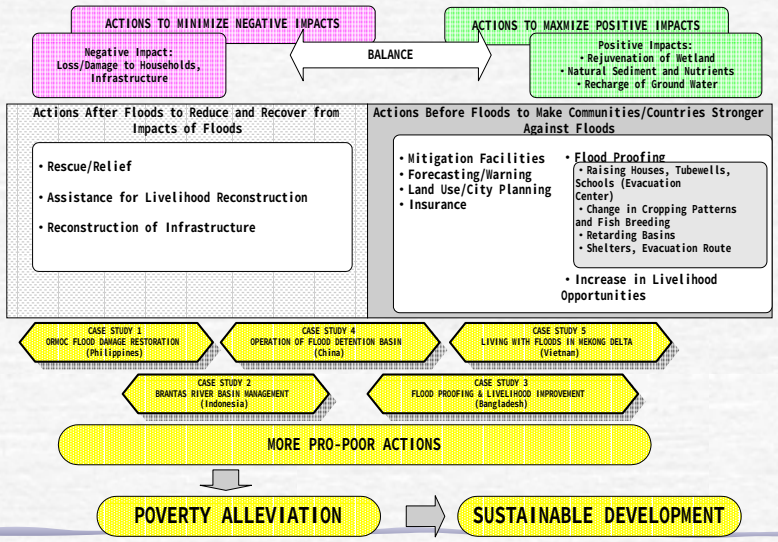
NEGATIVE AND POSITIVE IMPACTS OF FLOODS



9

Session Title: <2-8-7> Poverty and Floods

ACTIONS OF FLOOD MITIGATION AND MANAGEMENT FOR POVERTY ALLEVIATION



10

IN CONCLUSION

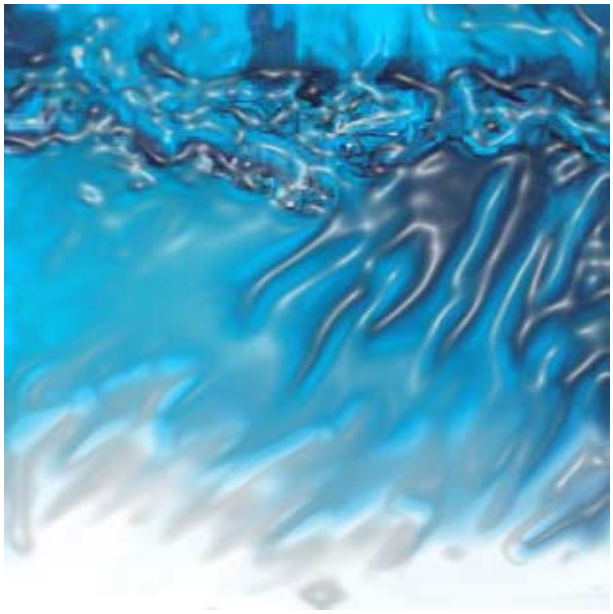
- Poverty specific discussion and conclusion;
- From rhetoric to concrete actions; and
- Importance and timeliness of the session "Poverty and Floods"

(2)　ケーススタディ

Case Study-1, Flood Damage Restoration Works with Structures in Ormoc City, Philippines

Mr. Bernardo P. Aman

OIC-Project Director, Project Management Office for Major Flood Control Project I, Department of Public Works and Highways, Philippines



第 2 次水資源プロジェクト研究計画調査

Flood Damage Restoration Works with Structures in Ormoc City, Philippines

Mr. Bernardo P. Aman

OIC-Project Director
Project Management Office for Major Flood Control Project I
Department of Public Works and Highways

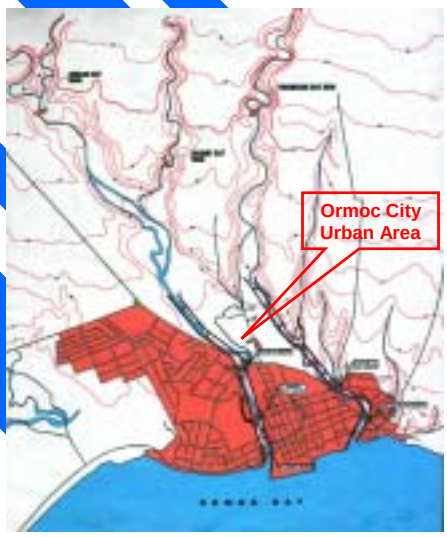
Location

Philippine Islands

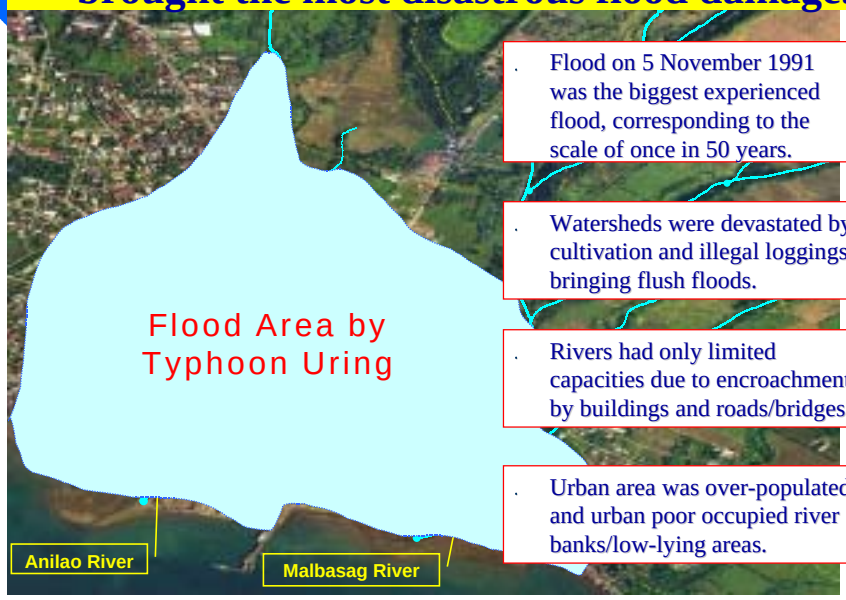
Ormoc City in Leyte, Visayas

Ormoc City was ---- on 5 November 1991

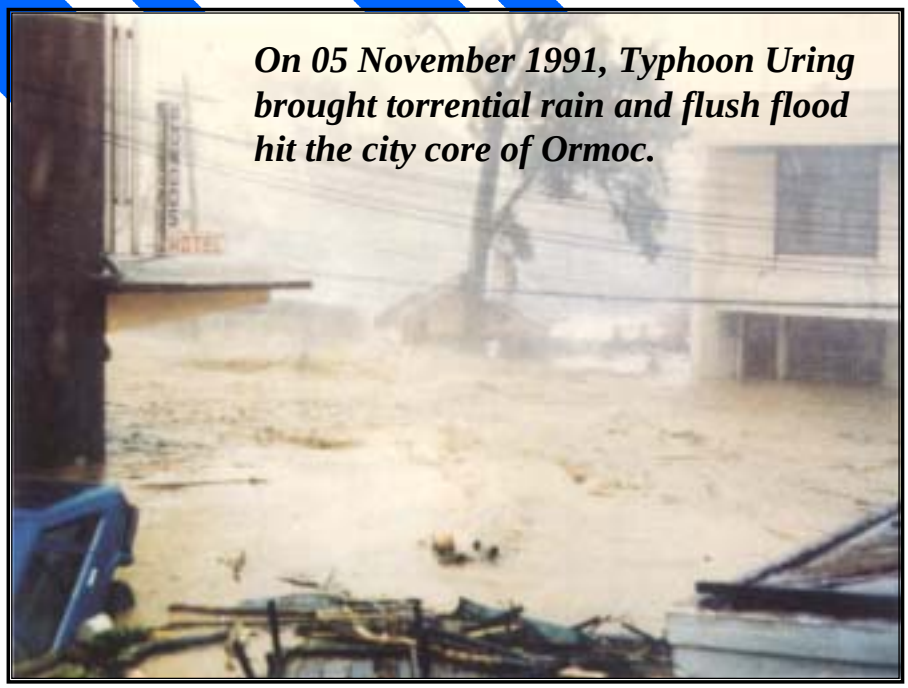
- Ormoc City is situated between two rivers: Anilao River and Malbasag River.
- Ormoc City is 464.3 km^2 with its area, while urban area is only 3.8 km^2 .on the deltaic land of the two rivers.



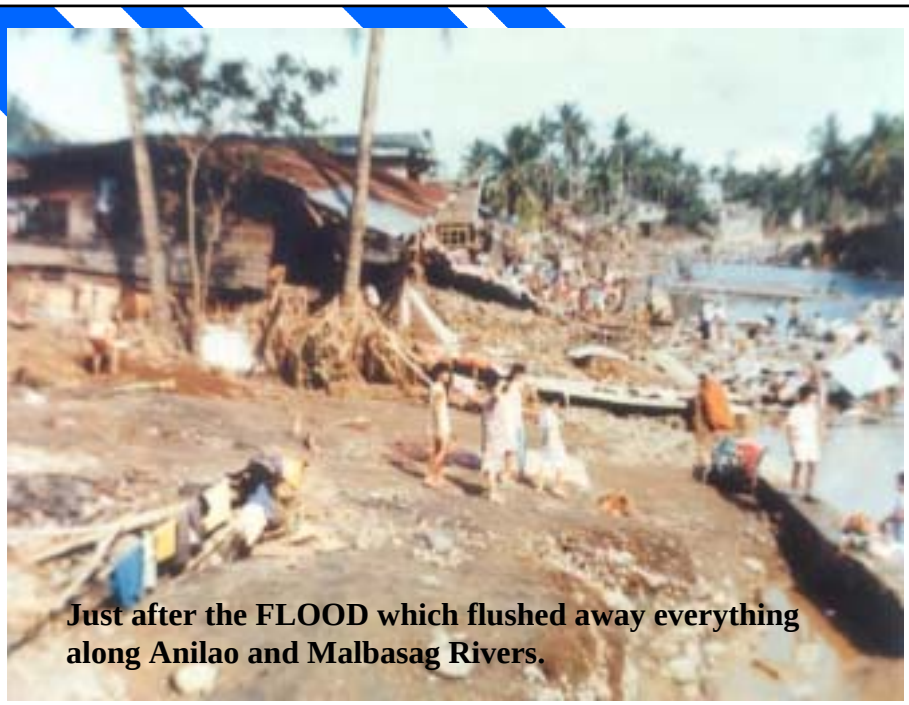
Typhoon Uring on 5 November 1991 brought the most disastrous flood damage.



- Flood on 5 November 1991 was the biggest experienced flood, corresponding to the scale of once in 50 years.
- Watersheds were devastated by cultivation and illegal loggings bringing flush floods.
- Rivers had only limited capacities due to encroachment by buildings and roads/bridges.
- Urban area was over-populated and urban poor occupied river banks/low-lying areas.


On 05 November 1991, Typhoon Uring brought torrential rain and flush flood hit the city core of Ormoc.


Flood water swept over the City's core area of 4 km^2 . with the depth of 1.5 m to 2.5 m.



Just after the FLOOD which flushed away everything along Anilao and Malbasag Rivers.

Deep Flood Inundation in Low-lying Area

Damage in 1991 Flood
(caused by Typhoon Uring)

- **7,922 persons death/missing**
- **13,760 houses destroyed (2,850 totally & 10,910 partially)**
- **More than US$23 million worth of damage to properties and infrastructures.**
- **Most of the victims were the urban poor who had dwelled on river banks and flood-prone area !**

Project Implementation

- Project was implemented by the Republic of the Philippines with the Japanese Grant-Aid Program through JICA.
- DPWH acted as the Executing Agency and its Project Management Office for Major Flood Control Projects (PMO-MFCP) is responsible for actual implementation
  - Design to construction, and
  - Maintenance and operation thereafter.

Project Works (1)

Before Construction of Slit Dam

- Three Slit Dams

After Construction of Slit Dam

Project Works (2)

Before Construction of Bridge

- Four New Bridges

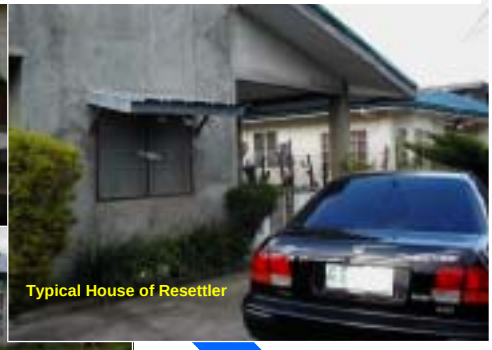
After Construction of Bridge


Anilao River Improvement
BEFORE
DURING
AFTER


Malbasag River Improvement
BEFORE
DURING
AFTER

The desire and will of the people is further manifested in the speedy and smooth relocation/resettlement of informal dwellers.

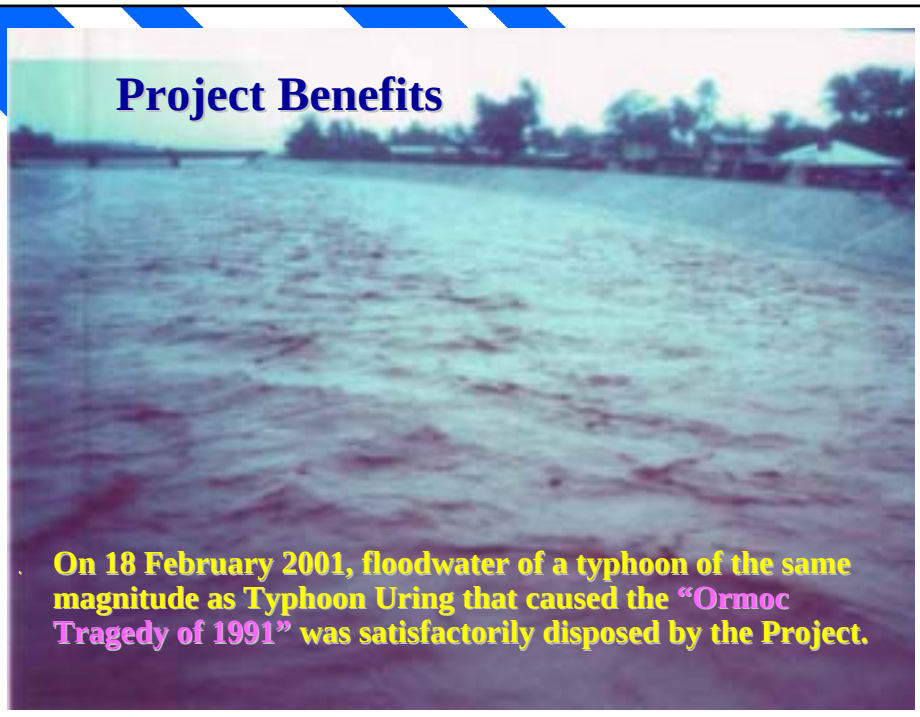

Statue of Engineer worked for the Project


Typical House of Resettler


Town Street and Houses

Resettlement Area in Barangay Lao (Outskirt of Ormoc City)

Project Benefits



On 18 February 2001, floodwater of a typhoon of the same magnitude as Typhoon Uring that caused the "Ormoc Tragedy of 1991" was satisfactorily disposed by the Project.

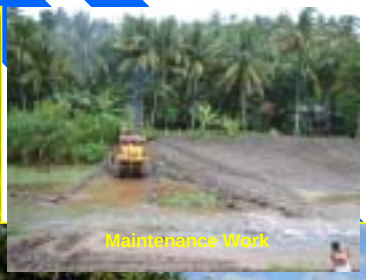
Operations and Maintenance

- A Flood Mitigation Committee was organized including the City, Barangay (County), NGOs, DPWH-4th LED and DPWH-PMO-MFCP.
- Actual operation and maintenance work is undertaken by the Technical/Monitoring Section of the Office of City Engineers.
  - Vegetation control;
  - Removal and disposal of garbage in the rivers;
  - Declogging of lined canals and culverts;
  - Repair/restoration/replacement of project facilities.
- Budget for 2002 is US$ 74 thousand.

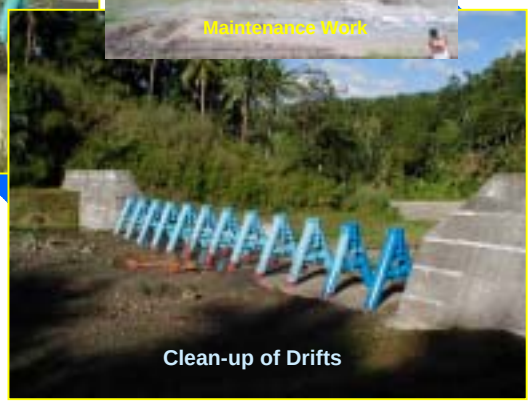
Maintenance of River: Cleaning and Removing Wastes

Maintenance of Slit (Sabo) Dam

After Flood (Stored Drifts)

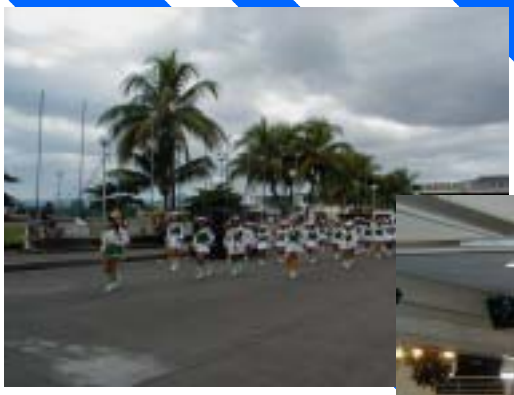


Maintenance Work



Clean-up of Drifts

River Festival and Seminar for O&M



Parade for River Festival and O&M Seminar

Ormoc City Mayor and Chairman: Mr. Calmero J. Locsin in the Seminar

Painting contest on the river bank in the River Festival on Dec. 4, 2003

Winning paint in the River Festival on Dec. 4, 2002.

River becomes a part of people's life.

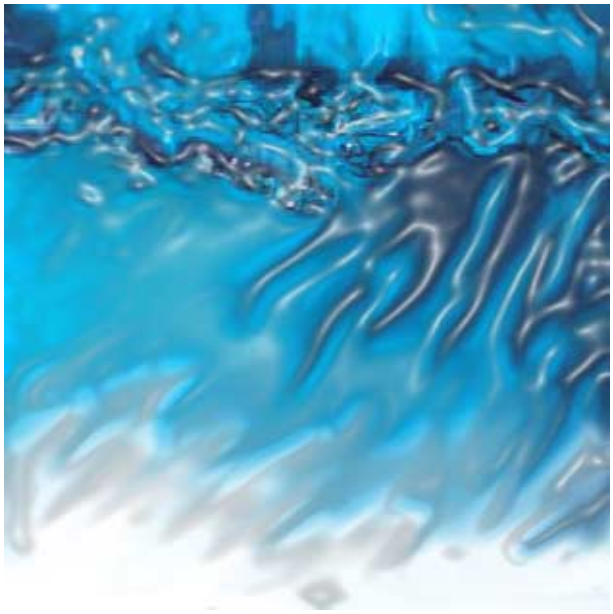
Concluding Statements

- It is clarified among the residents that if this project was not implemented, another destruction could have happened during those heavy rains, resulting in the devastation of river environment.
- It is well understood that the early involvement of people in realizing the project structures as well as preparing the operation and maintenance program has resulted in a smooth implementation of the Project and facilitation of expeditious institutional set-up/budgets for efficient conduct of O&M activities. In fact, the organization of Flood Mitigation Committee for the O&M of the flood control facilities is the first practice in the Philippines, further it actually proves a well understanding on maintenance works.
- All indications lead to the conclusion that project works and their maintenance activities can attain the sustainability of flood control works, conservation of river environment and alleviation of poverty for the area, as it radiates its effects to the region and the national economy as a whole.

Case Study-2, Sustainable Management of the Brantas River Basin in Indonesia

Usman Rusfandi

President,
Jasa Tira Public Corporation, Indonesia



第 2 次水資源プロジェクト研究計画調査

SUSTAINABLE MANAGEMENT OF THE BRANTAS RIVER BASIN THE REPUBLIC OF INDONESIA

by

Achmad RUSFANDI Usman
Brawijaya University, Indonesia

KYOTO, 18 March 2003

SUSTAINABLE MANAGEMENT OF THE BRANTAS RIVER BASIN

EAST JAVA PROVINCE, INDONESIA

Page-1 MAP OF FLOOD CONTROL STRUCTURES IN THE BRANTAS RIVER

1. INDONESIA CONSISTS OF ABOUT **17,000 ISLANDS**. AND THE NUMBER OF RIVER ARE ABOUT **5,500 RIVERS**. THE MAJOR RIVERS ARE ABOUT **90 RIVERS,** INCLUDING THE BRANTAS RIVER BASIN

2. TECHNICAL DATA`S OF THE BRANTAS RIVER ARE AS FOLLOWS
   - THE LENGTH OF THE RIVER IS ABOUT **320 KM**
   - CATCHMENT AREA IS ABOUT **12,000 SQ KM**
   - AVERAGE ANNUAL RAINFALL IS ABOUT **2,000 MM**
   - AVERAGE ANNUAL RUN OFF IS ABOUT **12 BILLION M^3**

Page-2 INTEGRATED DEVELOPMENT OF THE BRANTAS RIVER BASIN

1. INTEGRATED DEVELOPMENT OF THE BRANTAS RIVER BASIN WAS STARTED IN 1961 THROUGH A SERIES OF MASTER PLANS. BASIC CONCEPT OF THE DEVELOPMENT WAS **"ONE RIVER, ONE PLAN, ONE COORDINATED MANAGEMENT"**

2. THE MAIN OBJECTIVE OF EACH MASTER PLAN WAS,

   Ø MASTER PLAN I (1961) - FLOOD CONTROL

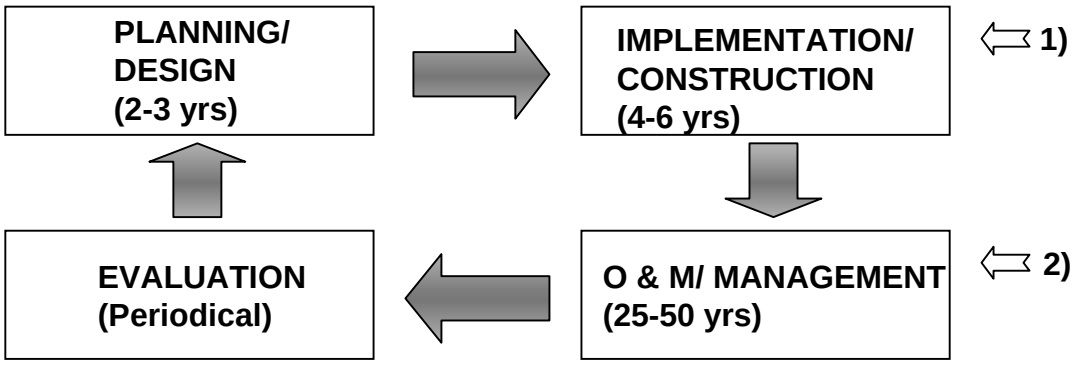
   Ø MASTER PLAN II (1973) - IRRIGATION
   (SUPPORTED NATIONAL FOOD PRODUCTION)

   Ø MASTER PLAN III (1985) - WATER SUPPLY
   (DRINKING WATER AND INDUSTRY)

   Ø MASTER PLAN IV (1998) - WATER RESOURCES MANAGEMENT
   (O&M OF INFRASTRUCTURES)

3. THE RESULTS OF DEVELOPMENT WERE: FLOOD CONTROL (UP TO 50 YEAR RETURN PERIOD), IRRIGATION (345,000 HA), ELECTRICITY (900 MILLION KWH/ YEAR), RAW WATER FOR DRINKING WATER (200 MILLION M^3/ YEAR). RAW WATER FOR INDUSTRY (120 MILLION M^3/ YEAR), RECREATION, FISHERY, ETC.

Page-3 DEVELOPMENT CYCLE OF THE BRANTAS RIVER BASIN



1) Period of investment

2) Period to get benefits

1. DEVELOPMENT CYCLE CONSISTS OF : **PLANNING** . **IMPLEMENTATION** . **O&M (RIVER BASIN MANAGEMENT)** . **EVALUATION**. AS SHOWN IN THE ABOVE DIAGRAM. RIVER BASIN MANAGEMENT NEEDS A LONGEST PERIOD COMPARED TO THE OTHER ACTIVITIES. THE SUCCESSFUL OF DEVELOPMENT IS, WHEN ALL OF THE ACTIVITIES HAS BEEN IMPLEMENTED PROPERLY, OTHERWISE THE BENEFITS WILL REDUCE.
2. ON THE OTHERHAND, NOT MANY PEOPLE TAKES CARE TO THE WATER RESOURCES MANAGEMENT. MOST OF THE PROJECT MANAGERS ONLY THOUGHT ABOUT TARGET OF THE PROJECT AND PROMOTED A NEW PROJECT. PEOPLE DID NOT UNDERSTAND THAT THE BENEFITS OF THE PROJECT ARE ON THE CAPABILITY TO MANAGE THE FINISHED STUCTURES.
3. THE EXAMPLE IS LIKE THIS : THE HYDROPOWER PROJECT WAS DESIGNED TO PRODUCE ELECTRICITY AMOUNTS TO 600 MILLION KWH/ YEAR LIFE TIME 25 YEARS. BECAUSE OF POOR MANAGEMENT AND DEGRADATION OF ENVIRONMENT, AFTER 5 YEARS COMPLETION THE ENERGY PRODUCTION IS ONLY 300 MILLION KWH/ YEAR. THEN, THE QUESTION: **“BASED ON THIS NEW CONDITION, IS THE PROJECT FEASIBLE ?”**
4. IN PRACTICE, THERE ARE MANY CASES SIMILAR TO THE ABOVE EXAMPLE, AS A RESULT A LOT OF INVESTMENT DID NOT GET BENEFITS BUT THE SUFFER LOSS PROJECT.
5. THE PROBLEM WAS CAUSED BY LACK OF BUDGET FOR O&M, LACK OF MANAGEMENT SKILLS AND LACK OF INSTITUTION RESPONSIBLE TO MANAGE FINISHED STRUCTURES.
6. IN THE CASE OF THE BRANTAS RIVER BASIN, IN 1990 GOVERNMENT OF INDONESIA ESTABLISHED A CORPORATION (STATE OWN COMPANY), NAMELY JASA TIRTA PUBLIC CORPORATION. THE CORPORATION HAS AN AUTHORITY TO COLLECT MONEY FROM THE BENEFICIARIES AND TO USE IT TO COVER COST OF WATER RESOURCES MANAGEMENT IN THE RIVER BASIN.

Page-4 WATER QUANTITY MANAGEMENT AND FLOOD CONTROL

1. IN ORDER TO CONTROL FLOODS MONITORING OF DISCHARGE WAS CONTROLLED BY EQUIPMENT CALLED FLOOD FORECASTING AND WARNING SYSTEM (FFWS), AS SHOWN IN THE PICTURE.

2. BASED ON EXPERIENCES IT WAS NEEDED INTEGRATED OPERATION BETWEEN TECHNICAL ASPECTS (PHYSICAL STRUCTURES) AND ADMINISTRATIVE ASPECTS (FLOOD FORECASTING, FLOOD WARNING AND FLOOD FIGHTING).

3. UP TO THE YEAR 2002, FLOODS IN THE BRANTAS RIVER CAN BE MANAGED PROPERLY.

Page-5 IMPACT OF FLOOD CONTROL PROJECT

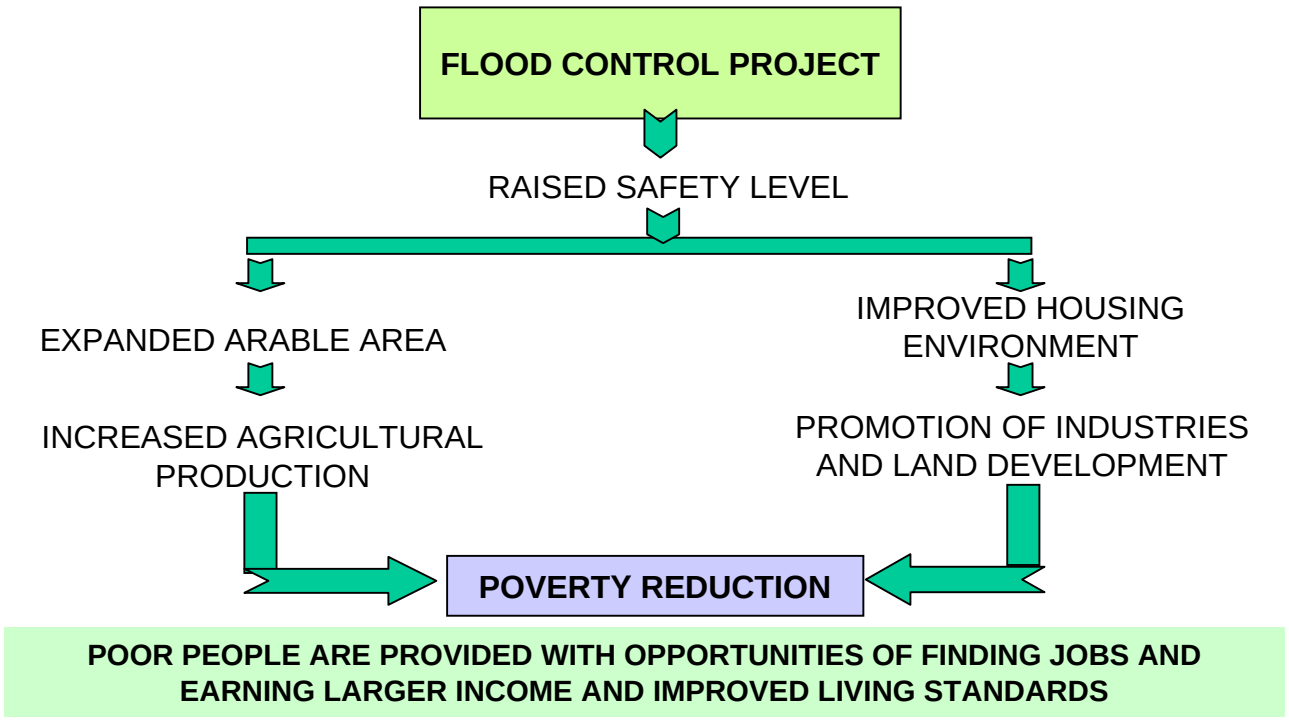


Table - Rice Production in the Brantas River Basin

(Unit-ton/ ha)

	1965	1970	1980	1990	1993	1999
All Indonesia	3.48	3.95	3.29	4.30	4.38	4.25
Brantas River Basin	3.69	4.55	4.62	5.43	5.67	5.22

FROM THE ABOVE DATAS IS SHOWN THAT RICE (PADDY) PRODUCTION IN THE BRANTAS RIVER BASIN WAS HIGHER THAN ALL INDONESIA IN ON AVERAGE.

Page-6 ECONOMIC EVALUATION

Table - Performance of infrastructures in the Brantas river basin.

Year	1991	92	93	94	95	96	97	98	99	00
Irrigation (1.000 ha)	345	345	345	345	345	345	345	345	345	345
Electricity (1,000,000 kWh)	324	845	907	828	948	883	554	1023	1014	945
Drinking Water (1,000,000 m3)	20	138	124	128	144	152	177	199	207	205
Industrial Water (1,000,000 m3)	23	132	145	127	135	133	134	123	123	125
Flood Control	*)	*)	*)	*)	*)	*)	*)	*)	*)	*)

*) 50 year return period flood can be managed

1. ECONOMIC EVALUATION HAS TO BE DONE BEFORE AND AFTER CONSTRUCTION.. ECONOMIC LIFE TIME OF WATER RESOURCES INFRASTRUCTURES USUALLY ABOUT 25 TO 50 YEARS. DURING THIS PERIOD, THE OWNER HAS TO GET BENEFITS FROM THE STRUCTURES. ACCORDING TO THE EXPERIENCES IN INDONESIA, BENEFITS OF STRUCTURE DECREASES BEFORE AT THE END OF LIFE TIME IT MEANT THE PROJECT WAS LOSS. ESPECIALLY THE STRUCTURES EFFECTED BY ENVIRONMENTAL CONDITION, SUCH AS DAMS, RIVER CHANNELS, DRAINAGE CANALS, QUALITY OF WATER, ETC.

2. IN THE CASE OF THE BRANTAS RIVER BASIN, THE STATE OWN COMPANY RESPONSIBLES TO SUSTAIN BENEFITS OF THE STRUCTURES. ECONOMIC EVALUATION HAS BEEN DONE EVERY YEAR AS SHOWN IN THE TABLE ABOVE .THE FIGURES SHOWS THAT UP TO YEAR 2000, THE BENEFITS CAN BE SUSTAINED.

Page-7 CONCLUSIONS

1. FLOOD MANAGEMENT ACTIVITIES IN THE BRANTAS RIVER CONSISTS OF TECHNICAL ASPECTS AND ADMINISTRATIF ASPECTS..

   FLOOD CONTROL IS ONE OF THE MAIN OBJECTIVE OF THE BRANTAS RIVER BASIN DEVELOPMENT.

2. WATER RESOURCES DEVELOPMENT HAS TO BE DONE AS INTEGRATED MANNERS LOOKING FROM THE SPRING OF THE RIVER DOWN TO ESTUARY AS AN UNITY. THIS CONCEPT CALLED **"ONE RIVER, ONE PLAN**, **ONE COORDINATED MANAGEMENT**", EVENTHOUGH FOR THE INTERNATIONAL RIVER. (THIS CONCEPT IS IN LINE WITH - UN CONVENTION ON THE LAW OF THE NON-NAVIGATIONAL USES OF INTERNATIONAL WATERCOURCES, NEW YORK, 21 MAY 1997).

3. O&M HAS AN IMPORTANT ROLE TO GET THE SUCCESS OF THE DEVELOPMENT. UNFORTUNATELY NOT MANY PEOPLE TAKE CARE TO THIS ACTIVITIES. AS A RESULT BENEFITS OF THE DEVELOPMENT TENDS TO DECREASE.

4. IN THE CASE OF THE BRANTAS RIVER BASIN, IN YEAR 1990, A STATE OWN COMPANY HAS ALREADY BEEN ESTABLISHED TO MANAGE THE BRANTAS RIVER BASIN AND HAS AN AUTHORITY TO COLLECT MONEY FROM THE BENEFICIARIES.

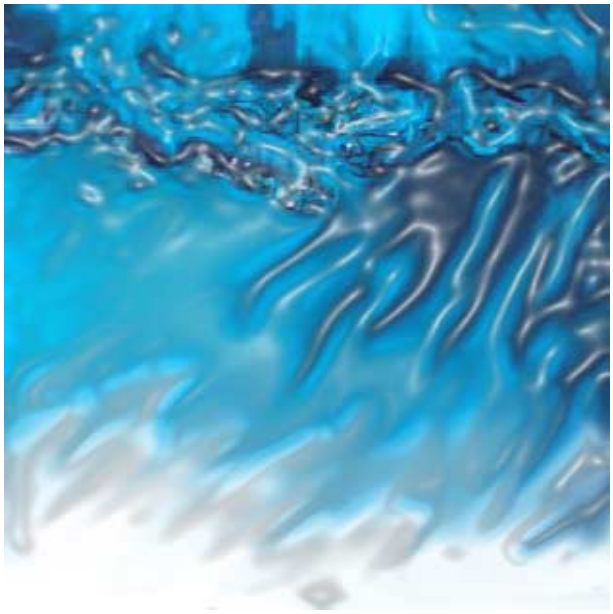
5. UP TO THE PRESENT, PERFORMANCE OF THE STRUCTURES CAN BE SUSTAINED.

THANK YOU

Case Study-3, Flood Proofing and Livelihood Development in Bangladesh

Md. Zahangir Alam

Project Director,
Local Government Engineering Department,
Bangladesh



第 2 次水資源プロジェクト研究計画調査

PRESENTATION
ON
FLOOD PROOFING AND LIVELIHOOD DEVELOPMENT IN BANGLADESH

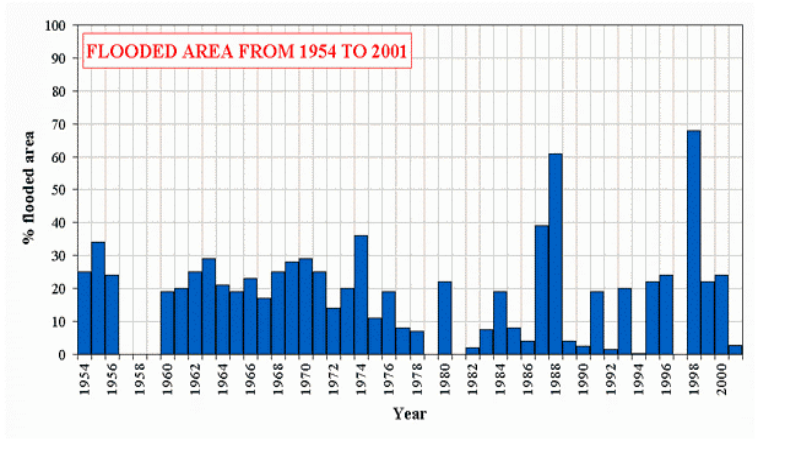
Md. Zahangir Alam
Project Director
Local Government Engineering Department.
Bangladesh

The 3rd World Water Forum
March 16-23, 2003, Japan

GEOGRAPHICAL LOCATION

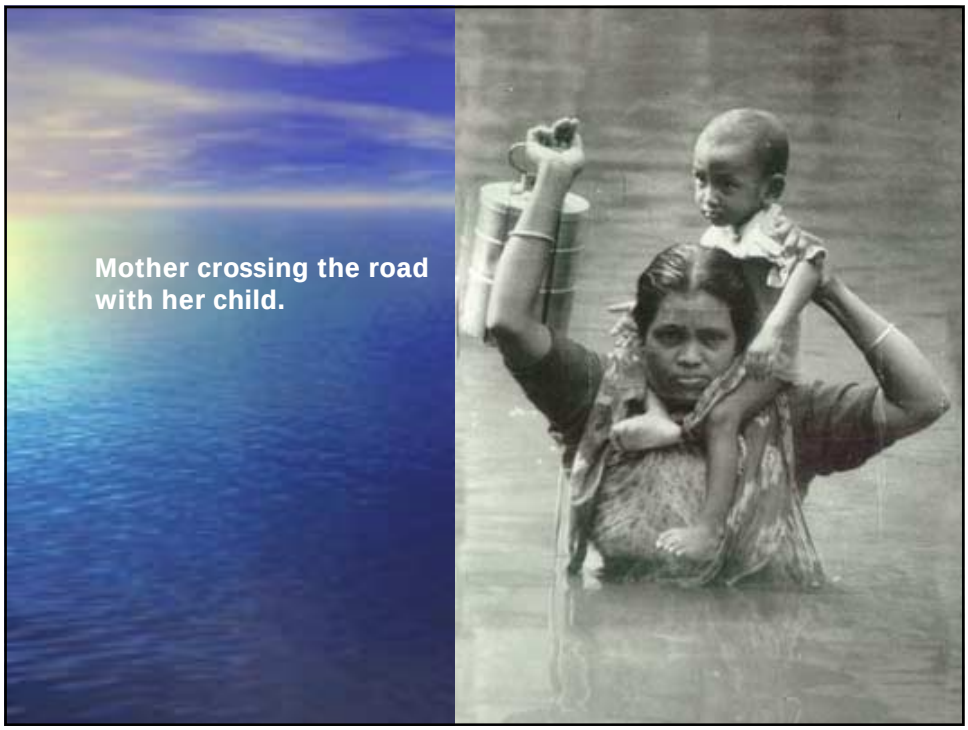
- **The country is bordered by India on the west, north and the northeast, Myanmar on the southeast and the Bay of Bengal on the south.**
- **It has a landmass of 148,393 sq. km.**

Overview of Flood in Bangladesh



Floods are a recurrent phenomenon in Bangladesh. Nearly 20 percent of its area is inundated even in a year of normal precipitation. About two-thirds of the country could be affected in a year of severe flooding.

People moving for shelter



Railway Track Inundated

Houses under Flood Water

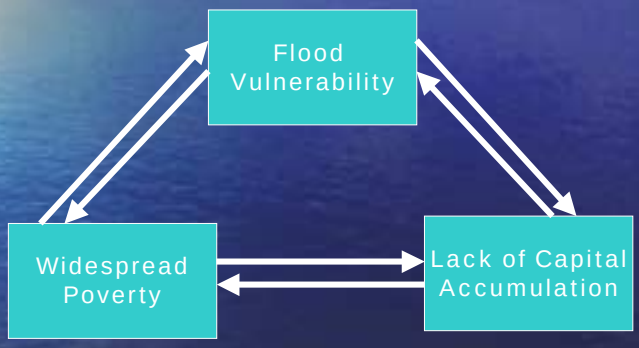
Road Communication Disrupted

RELATION BETWEEN FLOODS & PROVERTY

- Agriculture related activities (Farmer, Share-cropper & Agri-labour) are the main occupation in the rural Bangladesh. But during flood these people lose their income source due to submergence of farm land which makes them more poorer.
- The widespread poverty issue is a direct outcome of insufficient opportunities for income generation, low level of economic activities & productivity and large health expenditure.
- The widespread poverty is the only barrier for capital accumulation and livelihood development.
- The lack of capital accumulation, of course, is the major causing for vulnerability to flood.

VICIOUS CYCLE

The rural development in Bangladesh is seriously hindered by the vicious cycle, exists between the widespread poverty, lack of capital accumulation and flood vulnerability.



JICA ASSISTED STUDY ON RURAL DEVELOPMENT FOCUSING ON FLOOD PROOFING

Implementing Agency : LGED

Study Duration : December 2000 to June 2002

Study Area : Char Areas of Four Districts (Gaibandha, Kurigram, Sirajgonj, Jamalpur)

Haor Areas of Four Districts (Kishoregonj, Netrokona, Hobigonj, Sunamgonj)

STUDY AREA

OBJECTIVE OR GOAL OF RURAL DEVELOPMENT IN FLOOD PRONE AREAS

For implementing a support of Livelihood Development, an improvement of Living Environment and a Small Scale Flood Disaster Mitigation, 4 Specific Objectives or Goals are fixed up :

- To protect human lives and properties from severe flood.
- To facilitate the improvement of living environment with Flood Proofing.
- To support the livelihood development by providing training, education and other services together with Flood Proofing.
- Enhancement of people's capacity to make decisions on their own for development projects through their active participation.

Problem Identified by Study Team

The JICA Study Team identified the following problem structures in the Flood Prone Areas:

- **Lack of Livelihood**
- **Poor Social & Living Environment**
- **Chronic Flood Disaster**

Based on the Study, following components are recommended for comprehensive Rural Development :

- A Support of Livelihood Development
- An Improvement of Living Environment
- A Small Scale Flood Disaster Mitigation in combination with structural and non-structural approach

DEVELOPMENT PLAN FOR MODEL PROJECTS

Algar Char Gram : (Char Area)

1. Flood Proofing and Improvement of Living Environment

a. Homestead Rising (61 houses)

b. Raising of school ground as sheltering place (4500 m^2)

c. Raising of hand tubewells (five units) and new construction (one unit)

d. Flood Warning and Evacuation system establishment

2. Support Service for Livelihood Development

a. Home gardening promotion with nutrition education

b. Poultry promotion

c. Skill training on hand weaving

d. Mulberry plantation and cocoon production (long-term vision)

3. Savings and Credit Scheme :

a. Compulsory savings

b. Surcharges or user fees

c. Insurance and loan

Gurai Gram (Haor Area)

1. **Flood Proofing and Improvement of Living Environment**

   a. Wave protection (brick masonry retaining wall 1756 m length and 2.75 m height.

   b. Raising hand tubewells (27 units) and new construction (19 units)

   c. Flood Warning and Evacuation System established

2. **Support Service for Livelihood Development**

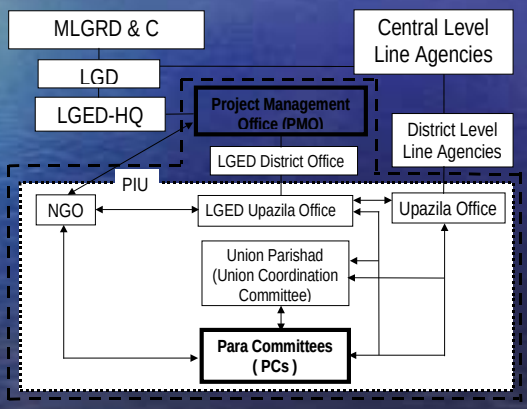
   a. Home gardening promotion with nutrition education
   b. Poultry (duck) promotion
   c. Fish Culture promotion
   d. Nursery development for social forestry
   e. Entrepreneurship development for paraboiling plant operation.

3. **Saving and Credit Scheme :**

   a. Compulsory savings
   b. Surcharges or user fees
   c. Insurance and loan

IMPLEMENTATION ARRANGEMENT

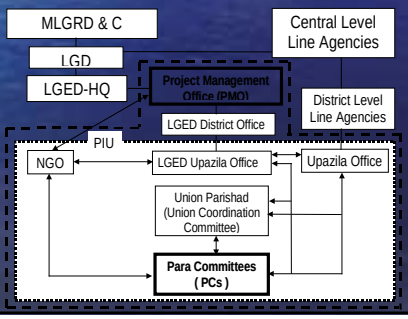
For ensuring the coordinated implementation of the project, the Study Team recommended to establish a Project Management Office (PMO) in LGED HQ in Dhaka.



IMPLEMENTATION ARRANGEMENT

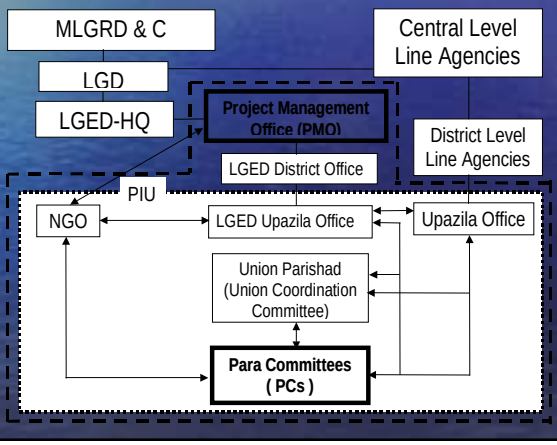
Under close guidance and supervision of PMO, the LGED district offices in the project areas will be responsible for day-to-day activities with assistance from LGED upazila(sub-district) offices.

The LGED upazila office, in cooperation with NGO facilitator, would assist local people to establish Para Committee consists of the representative of the small village areas.



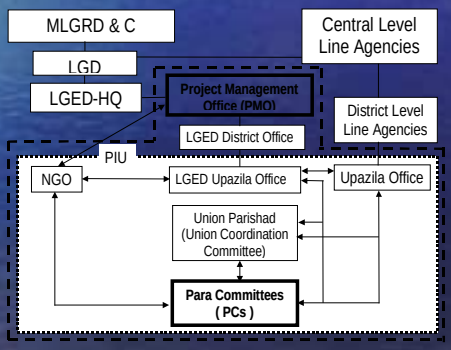
IMPLEMENTATION ARRANGEMENT

To provide technical support and guidance, a Project Implementation Unit (PIU) will be established at the Upazila level. PIU will be composed of the LGED Upazila Office, Upazila Administration, Other Upazila level Government Offices, Union Parishad, Para Committee and NGOs.



IMPLEMENTATION ARRANGEMENT

Para Committee (PC) will be responsible for operation & maintenance (O&M) arrangements for structural flood control measures, flood warning and evacuation system, livelihood projects and cost sharing in cash & in kind for construction works and the establishment of the saving and credit schemes.



FEW ACTIVITIES OF US_AID SUPPORTED FLOOD PROOFING PROJECT

Homestead Rising by Earthwork

FEW ACTIVITIES OF US_AID SUPPORTED FLOOD PROOFING PROJECT

Reconstructing the House after Platform Raising

FEW ACTIVITIES OF US_AID SUPPORTED FLOOD PROOFING PROJECT

Slope Protection by CC Block in Haor Area

FEW ACTIVITIES OF US_AID SUPPORTED FLOOD PROOFING PROJECT

Flood Shelter Cum Primary School

FEW ACTIVITIES OF US_AID SUPPORTED FLOOD PROOFING PROJECT

Home Gardening

FEW ACTIVITIES OF US_AID SUPPORTED FLOOD PROOFING PROJECT

Home Gardening in the Slope

FEW ACTIVITIES OF US_AID SUPPORTED FLOOD PROOFING PROJECT

Raised Latrine

FEW ACTIVITIES OF US_AID SUPPORTED FLOOD PROOFING PROJECT

Training Program on Health Care

Conclusion :

The people living in the flood prone areas suffers a lot every year and their economic and social development is hindered seriously due to the losses causes by flood. But adequate intervention for flood mitigation yet not been there.

Government, NGOs and Development Partners may come forward with more support to stand beside those distress people.

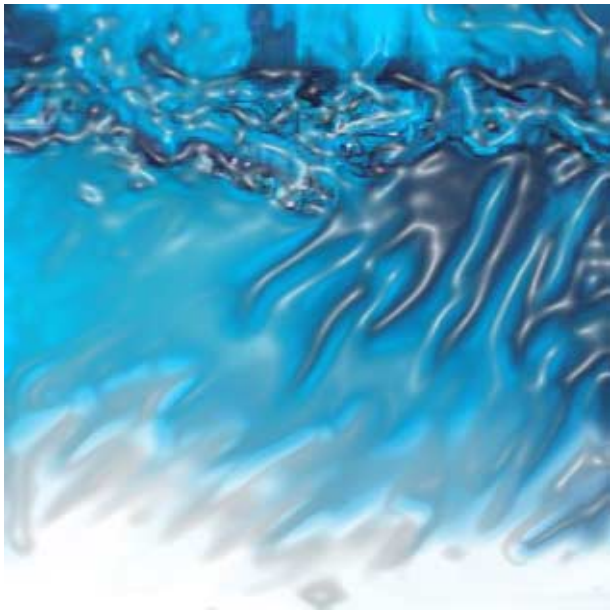
LGED has taken up two flood proofing model projects (one in char and other in haor) with the assistance from JICA. With the experiences of those model projects, LGED has intention to implement a complete flood proofing and livelihood supporting project for the entire areas to mitigate flood disaster and poverty.

We believe that this type of program of flood proofing and livelihood supporting will be very much effective to cut off the vicious cycle between the widespread poverty, lack of capital accumulation and flood vulnerability in other developing countries.

Case Study-4, Lessons Learned From Operation of Flood Detention Basins in China

Dr. Huang Jinchi

Flood and Drought Disaster Mitigation Research Center
Ministry of Water Resources
Peoples Republic of China



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Lessons Learned From Operation of Flood Detention Basins in China

Dr. Huang Jinchi

Flood and Drought Disaster Mitigation Research Center
Ministry of Water Resources
Peoples Republic of China

Typical flood detention areas of China

River	Number of Basins	Total Area (km^2)	Farmland (million ha)	Population (million persons)	Storage capacity (million m^3)
Yangtze	40	11,866	0.55	5.69	63.7
Yellow	6	9,169	0.61	4.71	7.8
Huaihe	27	3,912	0.24	1.62	8.6
Haihe	25	9,560	0.57	4.14	17.0
Total	98	34,507	1.96	1.62	97.1

Diversion discharges of key flood detention basins indicate their significant role in flood control

Diversion discharge of key flood detention basins

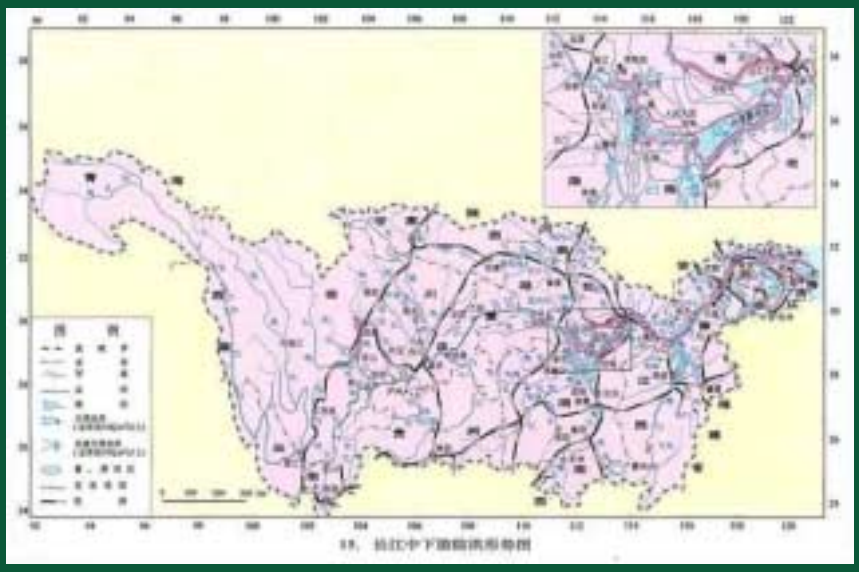
River	Discharge in river (m^3/sec) (1)	Diversion discharge (m^3/sec) (2)	Ratio (%) (2)/(1)
Beijindi, Yellow	22,300–30,000	7,500–10,000	34
Jingjiang, Yangtze	80,000	20,000	25
Dujiatai, Hanjiang	18,400	4,000	22
Mengwa, Huaihe	5,000	1,620	32
Xiaoqinghe, Yongding	4,000	1,500	38

7 major river basins of China

Water disasters and poverty in flood detention basins

Flood Retarding Areas

Yangtze River Basin



Yellow River Basin

Flood detention areas → 5 but only 1 has ever been used (Dongpinghu Lake)

Population → 1.7 million; evacuation will be needed

1982 operation → maximum discharge at Huayuankou station was 15,300 m^3/sec

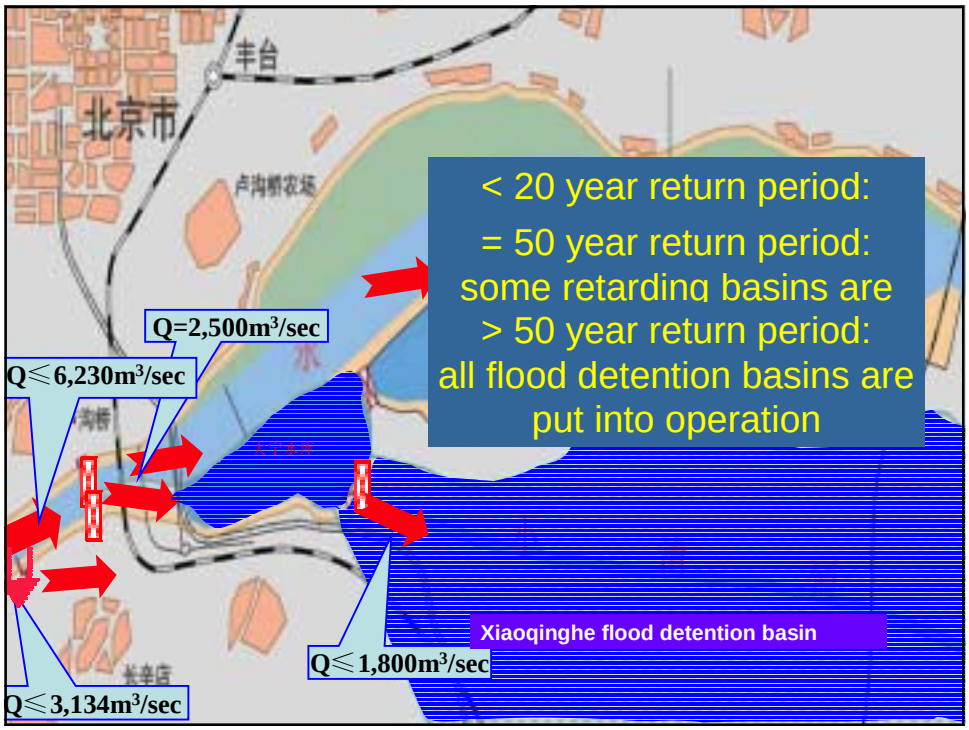
Huaihe River Basin

Flood retarding basins	→ 27
Total storage capacity	→ over 17 billion m^3
Population	→ 4.9 million
Affected area	→ over 9,560 km^2

Haihe River Basin

Flood retarding areas
→ 25
Total storage capacity
→ over 17 billion m^3
Population
→ 4.9 million
Affected area
→ over 9,560 km^2

Careful planning is essential for detention basin operation



Required safety facilities

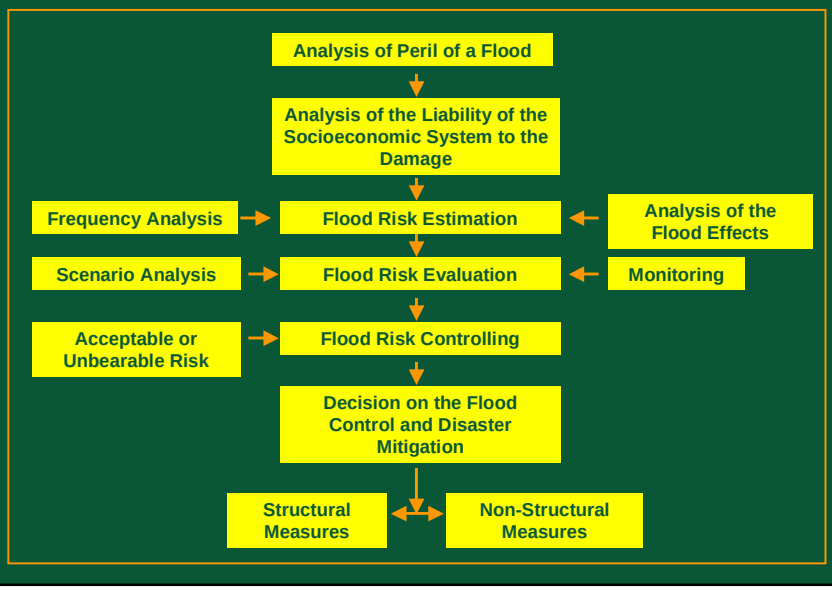
Haihe River Basin example

- over 2,320,000 m² of flooded area
- 310,000 m² of safe houses
- 751km of evacuation roads
- 23% of population in flood detention basins guaranteed safety

Flood early warning capacity

- Numerical modeling
- Information network
- Testing and verification
- Training for warning decision makers
- Warning announcements

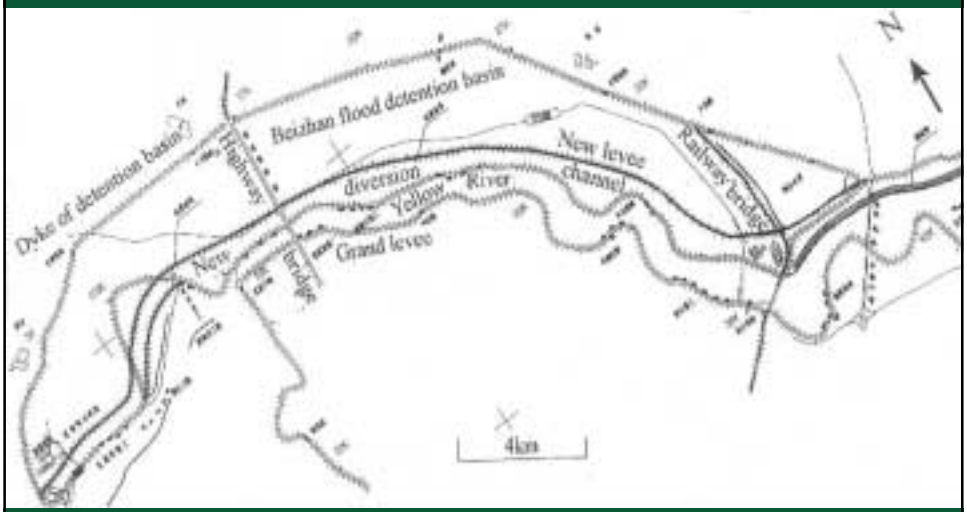
Post-flood recovery and flood insurance program



Post-flood recovery and flood insurance program

- Insurance is a water disaster risk sharing strategy for the entire community
- Fundamentals of water disaster insurance
  "*A successful water disaster insurance system must build a mechanism to encourage local stakeholders, including administrative agencies and the private sector, to take all measures necessary to reduce water disaster damage as much as possible*"

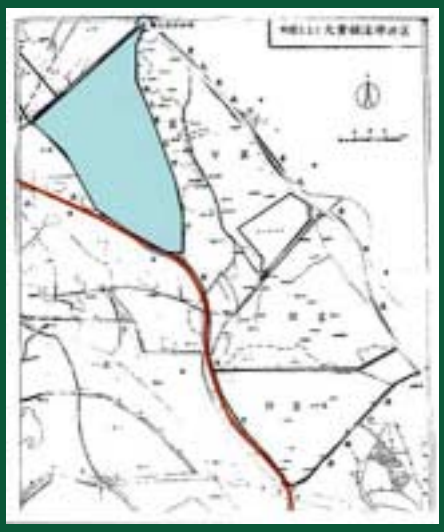
Combining flood diversion and flood detention to reduce impacts



The decision to flood or not to flood detention basins has political and social impacts

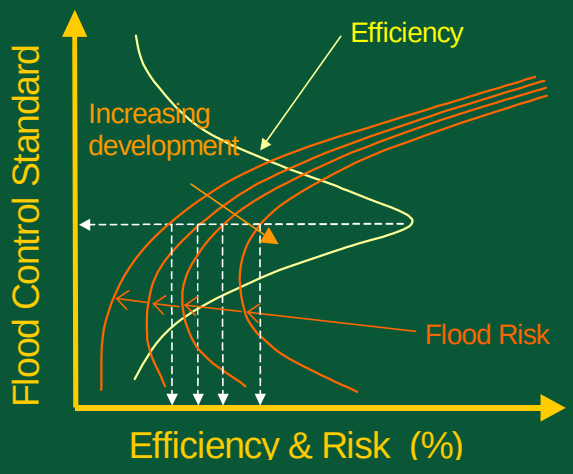
Changing land use mode can provide permanent benefits

- Partial flood detention during extreme flood events
- Waste water treatment using new technologies
- Permanent change in land use mode



Need for appropriate flood control strategy

- Careful decision making
- Evaluating all flood risks

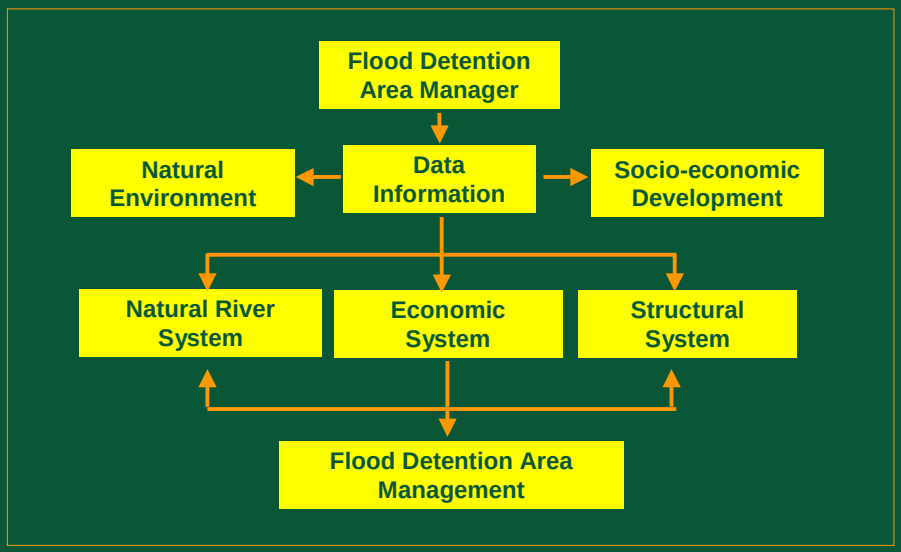


Management of flood detention areas is complex

- different management aspects have to be considered together
- management of multiple objectives is required
- river system cannot fulfill all of its functions all of the time; or even at the same time

- the physical, chemical and biological processes in a river system are complex
- many competing management measures are available
- coordination between agencies and affected population is essential

Principles of flood detention basin management



Conclusion

Efficient multi-stakeholder management and use of flood detention basins are traditional flood coping mechanisms that are being revived in China

The challenges are daunting.
The rewards will be impressive.

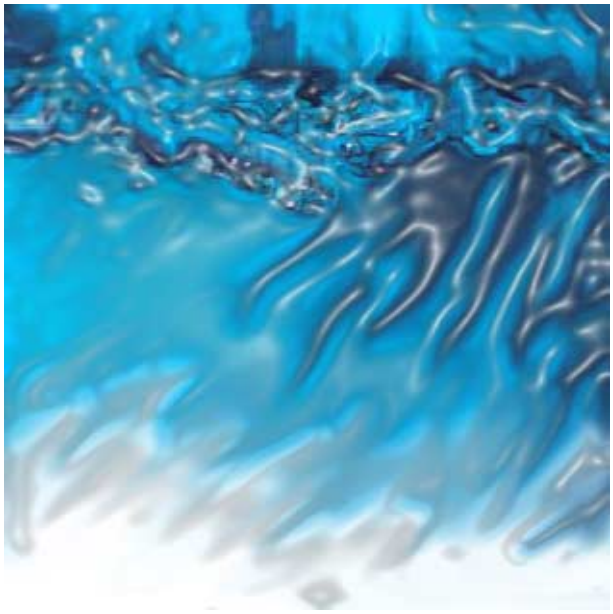
Case Study-5, Living with Floods in the Mekong River Delta of Viet Nam

Dang Quang Tinh

Central Committee for Flood and Storm Control

Pham Thanh Hang

United Nations Development Programme-Viet Nam



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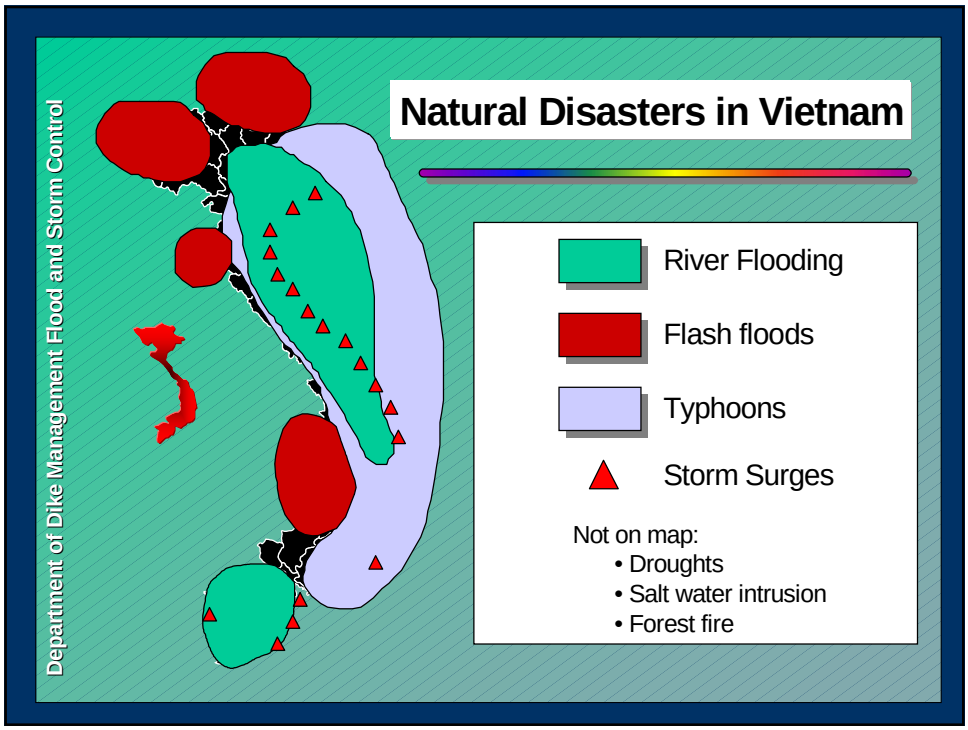
Living with Floods in Viet Nam's Mekong River Delta

Dang Quang Tinh
Central Committee for Flood and Storm Control
Pham Thanh Hang
United Nations Development Programme-Viet Nam

About the Mekong River Delta of Viet Nam

- Land: 4 million ha
- Cultivated land: approx. 3 million ha
- Population: 16 million
- Supplies more than 50% of staple food and 60% of fish production for entire nation
- Accounts for 27% of total Viet Nam's GDP



People's Perception of Floods

- Floods are a natural feature
- Floods have both positive and negative impacts
- People do not consider floods; per se, as disasters. It is a disaster when there is no flood, or an early or a big flood.

Severe floods in 2000, 2001 & 2002
in the Mekong River Delta of Viet Nam

"Living with Floods" Concept

- To "co-exist" with floods to maximize benefits and mitigate negative impacts

- Practiced by people for years through different coping mechanisms
- Government's main strategy for disaster mitigation in the Mekong River Delta of Viet Nam since late 1990s

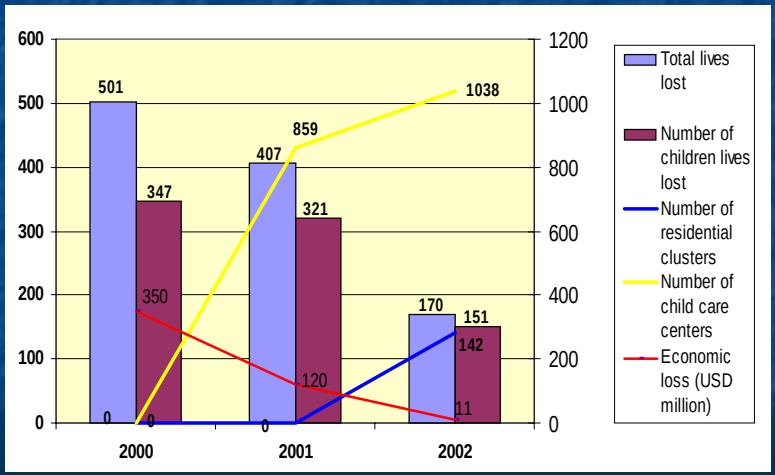
Model of school on stilts

ÃOnh: Quang Trí, 2001

Government Measures for Living with Floods

- Building residential clusters
- Building flood proof housing
- Building dykes and boundary embankment
- Shifting of crop calendar
- Improving flood release capacity
- Establishing child care centers
- Conducting child safety training

Initial Progress



Lessons Learned

- Quality of infrastructure investment
- Need for social and environmental facilities
- Awareness raising and participation of people are essential
- Targeting the poorest of the poor
- Integrated and coordinated planning in Lower Mekong Basin is crucial
- Child care center model as a cost-effective and non-structural measure

Floods and Poverty

- Flood disasters increase poverty and vulnerability of the poor
- Floods disasters set back hard worn development efforts; And
- Floods do challenge the progress toward achieving the Millenium Development Goals (MDGs).

Floods Challenge the MDGs

- Flood disasters cause poverty and slow poverty reduction rate in the Mekong Delta
- Floods contribute to low literacy and net enrollment rates,particularly among girls
- Extremely low rate of access to clean water
- Water-borne diseases & limited access to health care
- Increased migration and vulnerability to HIV/AIDS
- Poor women suffer the most during floods

New Initiatives for "Living with Floods"

- ICT for early warning and information sharing
  www.undp.org.vn/dmu
- Establishment of a self-reliant disaster fund
  - UN-NGOs joint disaster assessment to capture social and ecological impacts
  - Sound methodology to calculate economic loss and coping mechanisms by the people – the basis for involving insurance companies
  - Importance of Pro-poor policies and programs in Disaster reduction
- Application of disaster-resistant building codes

How to Move Forward

- Foster inter agency collaboration of National actors
- Use the Natural Disaster Mitigation Partnership (NDM-Partnership) to build partnership among Government, Donors and NGOs

  www.undp.org.vn/dmu/ndm-partnership
- Collaboration with BP, Microsoft and Price Waterhouse Cooper as an example of public-private partnership for human safety and well-being and corporate social responsibility

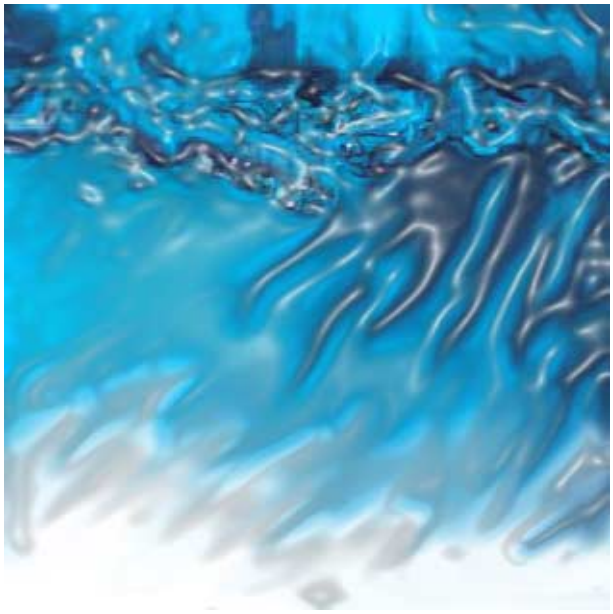
Thank You

(3)　議長まとめ

Panel Discussion, Chairman

Mr. Hidetomi OI

Senior Advisor,
Institute for International Cooperation, JICA,
Japan



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Session: "POVERTY AND FLOODS"
in the Cross-Cutting Issue of "Floods"

General Discussion

Key Issues

◆Millions of people have been suffering from floods every year by loss of lives, properties, means of life, and access to vital infrastructure and services. These adverse impacts affect the poorest segments of the society most severely .

◆The vulnerability has been progressing as a result of the vicious cycle of population growth, destitution, environmental deterioration and the increase in population especially the poor at high-risk areas.

◆The lack of capacity to limit the impact of floods remains a major burden for developing countries mainly due to limited resources while there are many pressing issues in various sectors.

◆Thus, despite of achievements made so far, flooding has been increasing in terms of frequency and damage as the vulnerability progresses, aggravating the poverty situation and hampering the social and economic development of communities/regions/countries.

Actions and Recommendations (1/2)

- In the selection of projects, priority should be placed on projects, which will contribute more to poverty alleviation, by including "poverty alleviation" in the criteria for project selection.
- In the decision-making process of projects, opinions of the poor should be appropriately reflected, so as to minimize the adverse impact and to maximize the beneficial impact of the projects for the poor.
- Likewise, in the design of projects, livelihood improvement, job creation and other pro-poor elements should be considered, in order for the poor to benefit from the projects as much as possible.
- Different approaches should be adopted according to the conditions of flood prone areas: a high standard protection for urban and other highly populated developed areas; and relatively limited protection by flood proofing etc. for other areas, maximizing beneficial impact of floods.

Actions and Recommendations (2/2)

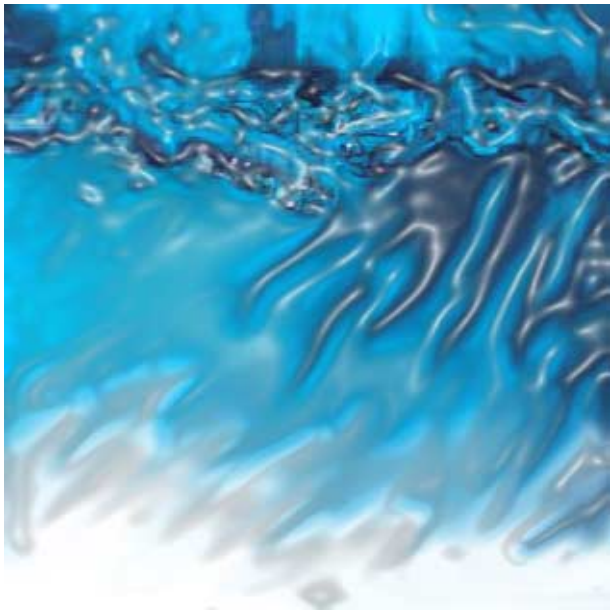
- The advantage of traditional means of coping with frequent, low-intensity floods developed by communities should also be considered.
- Flood vulnerability analysis should be the starting point of preparation and operation for flood mitigation and management plan.
- In view of the ever increasing vulnerability to floods in many countries, more resources should be allocated to flood mitigation and management projects of various types appropriate to local conditions.

(4)　パネリストのコメント

Panel Discussion, Panel Member-1

Shun-ichi Maeda

JICA Expert for Water Resources Policy,
The Ministry of Land, Infrastructure and Transport (MLIT)
Japan



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Flood Control Projects Contribution to Basin Development and Poverty Alleviation

MAEDA Shunichi

Flooding brings disease on top of destruction

Inundation Area Resulted from the Big Flooding in 1964

Study Area

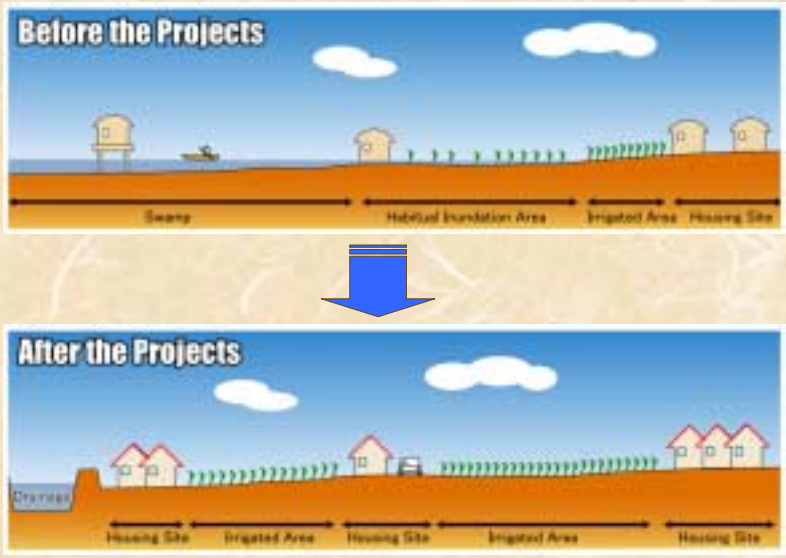
Tulungagung Prefecture
Ngrowo River Basin

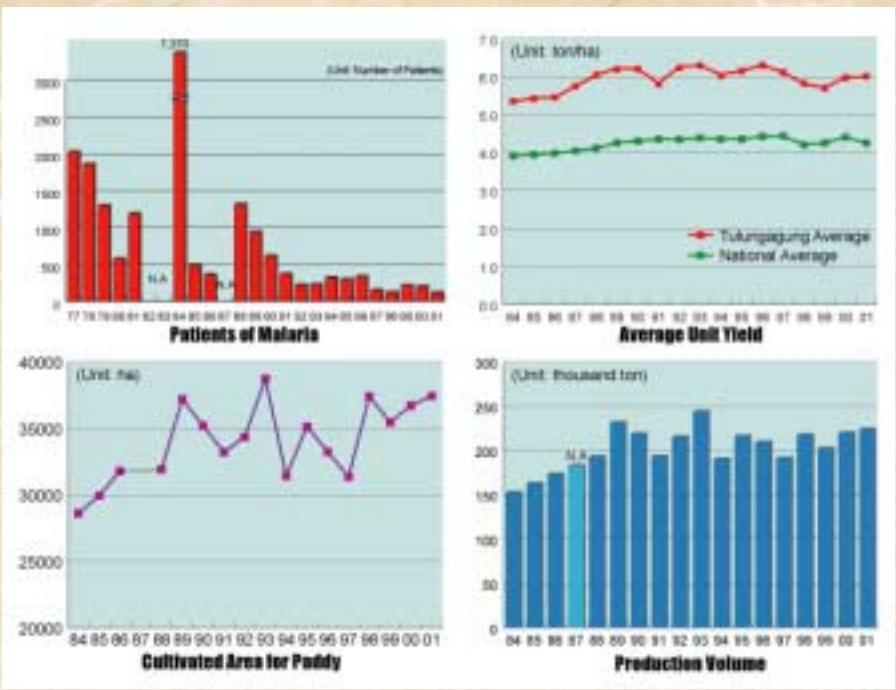
Change in the Land Use

Bening Swamp
(Before the Projects: 1959)

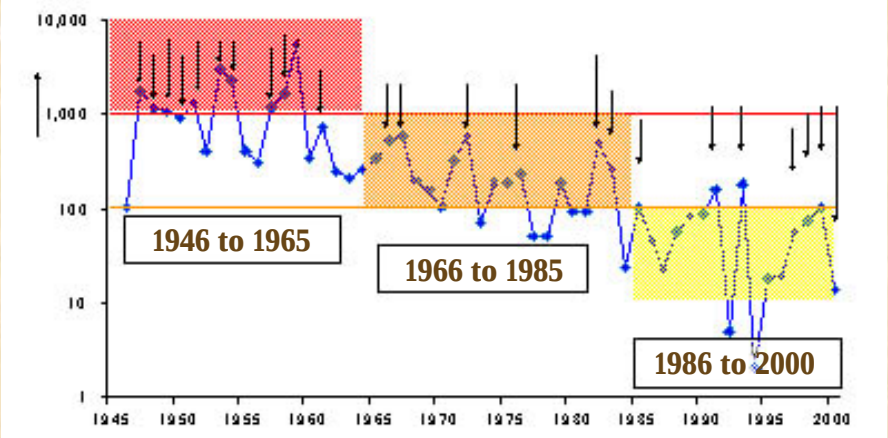
Fertile Paddy Field
(After the Projects: 2002)

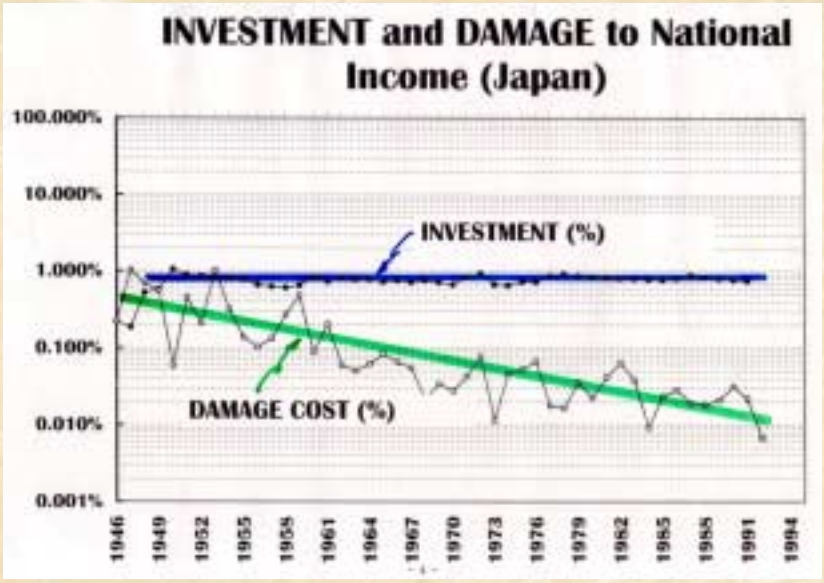
Change in the Land Use



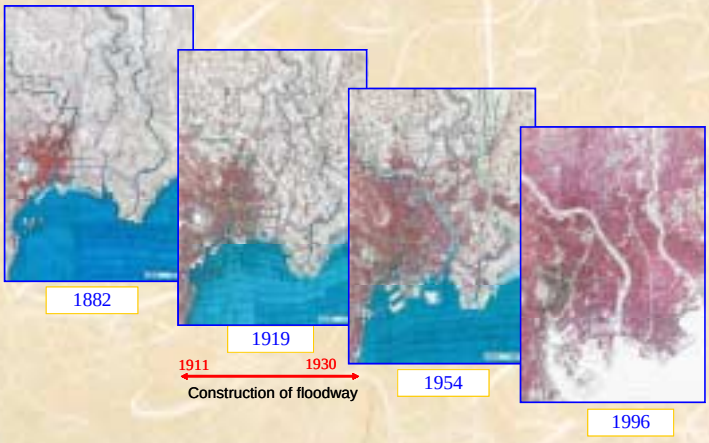


Decrease the Number of Fatalities

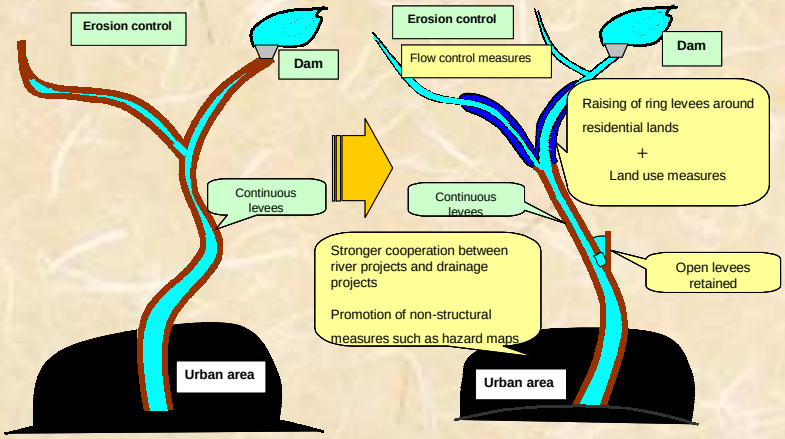




Urban Development by Floodway



Comprehensive Flood Control Concept



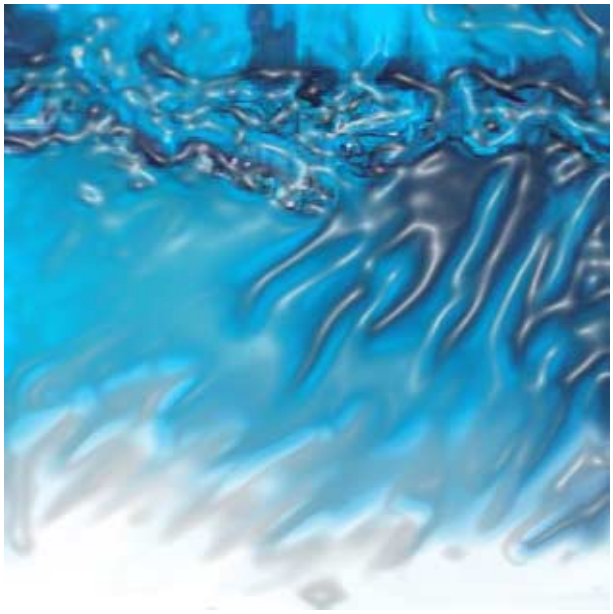
Conclusion

- The flood, as the most damaging natural disaster, is an important problem to be solved to ensure sustainable development and poverty alleviation.
- Well-planned and continuous flood control contributes to regional development and poverty alleviation.
- Appropriately selecting and combining measures (structural and non-structural measures) in accordance with environmental/social conditions in each basin is essential.
- It is necessary to make clear the effect of the projects regarding poverty alleviation including baseline data collection.

Panel Discussion, Panel Member-2

Senichi Kimura

Director
Japan International Cooperation Agency (JICA)
Japan



第 2 次水資源プロジェクト研究計画調査

Message from JICA on Poverty and Floods

Senichi Kimura
Director of 2nd Social Development Study Division
Social Development Study Department
Japan International Cooperation Agency (JICA)

Consideration for the Socially Vulnerable, the Poor, and Gender Issues

1. To prioritize projects which aim at poverty reduction in project screening process
2. To understand the situation of the socially vulnerable, the poor, and gender issues (social analysis) prior to project delivery
3. To promote the participation of the socially vulnerable, the poor, and women in decision making and contributing to improvements in their social status
4. To contribute to improving the lives of the socially vulnerable, the poor, and women
5. To employ technologies taking into account the socially vulnerable, the poor, and women

More Pro-poor Approach

1. To prioritize of projects, which aim at poverty reduction in project screening process

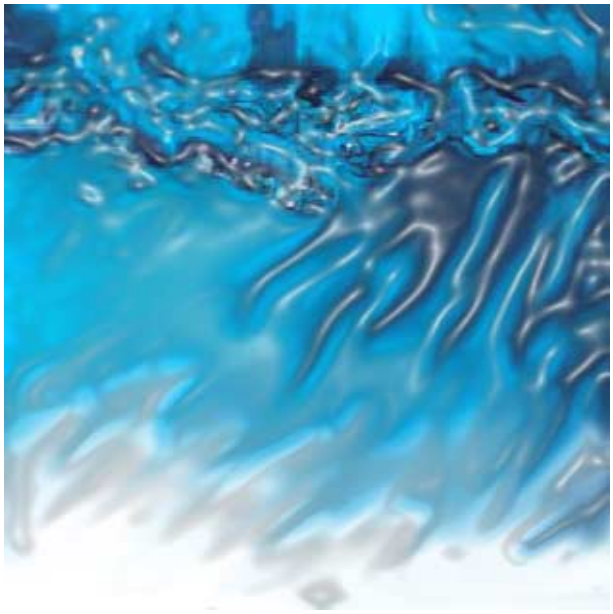
2. To promote more participation of the poor in decision making, from project formulation to project implementation

3. To promote projects in order that the poor can get maximum benefit

Panel Discussion, Panel Member-3

Ian B. Fox

Principal Project Specialist
Asian Development Bank (ADB)
Philippines



第 2 次水資源プロジェクト研究計画調査

Reducing the Vulnerability of the Poor to the Negative Impacts of Floods

Ian B. Fox
Principal Project Specialist
Asian Development Bank

ADB

Floods: what we know

- mostly caused by natural phenomena
- recurrent, widely varying in severity, and largely unpredictable
- only disastrous when people and property are in the way

ADB

Engineering approach falls short

Flood control projects encourage further investment and development in flood-prone areas, requiring even larger control works

ADB

Crisis management…

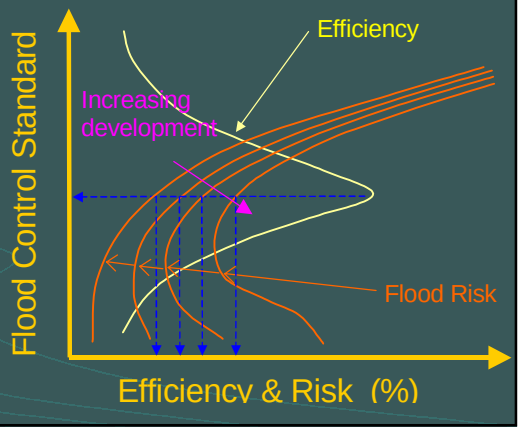
When flood control structures are the primary line of defense, flood management becomes crisis management.

Songhua River, 1998

ADB

Adopting an appropriate flood control standard

- **Appropriate flood control standard gives optimum economic efficiency while balancing flood risk against flood magnitude.**
- **Flood risk includes the combined effects of:**
  - *Design and construction risks*
  - *Flood inundation risk*
  - *Structural failure risk*
  - *Other risks*



ADB

Who suffers most

1. Poor people in cities and rural areas living near rivers and in floodplains 2. People living in coastal areas prone to surges	• Lives lost, people injured • Homes, possessions, crops, livestock, and other means of livelihood lost • Water-borne diseases spread
3. Owners of large commercial interests in floodplains 4. Regional and national economy	• Businesses disrupted • Jobs and incomes lost

Living with floods...

In the flood corridor of China's Yellow River, villages are being relocated on raised platforms

Live with floods...

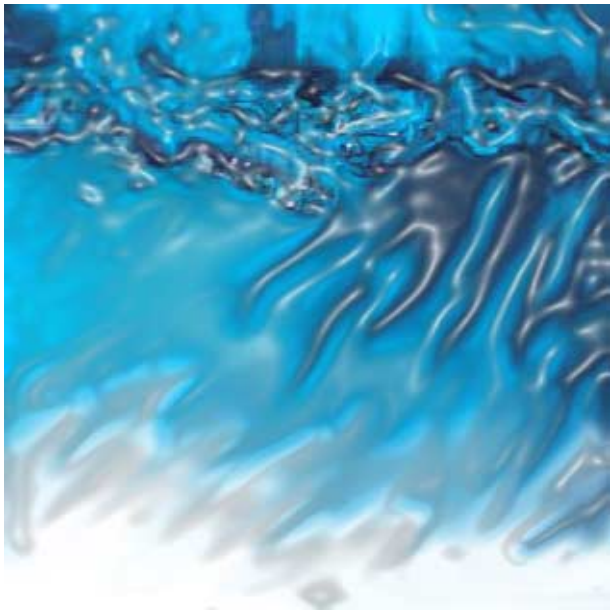
Maximize the beneficial impacts of floods and conserve wetlands.

ADB

Panel Discussion, Panel Member-4

Cheng Xiaotao

Director
Water Disaster Mitigation Center, IWHR
People's Republic of China



第 2 次水資源プロジェクト研究計画調査

How to formulate appropriate means of reducing the vulnerability of the poor ?

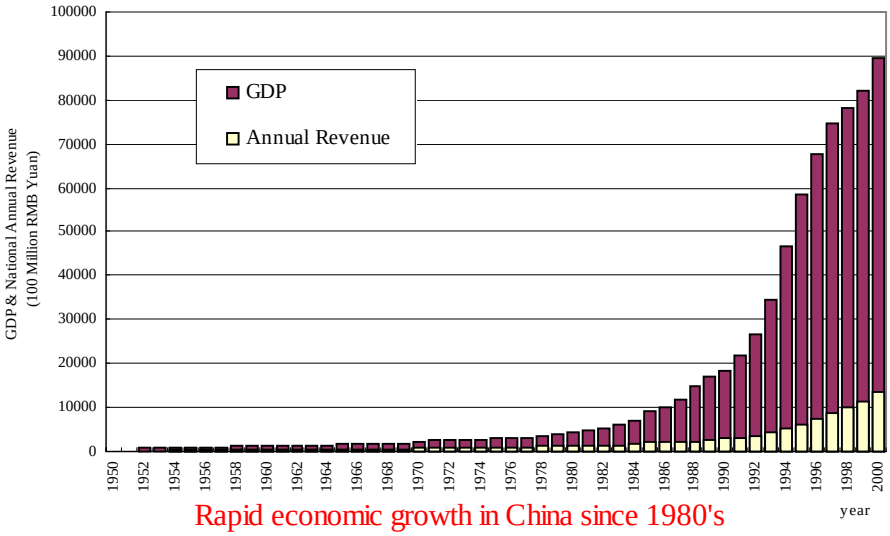
Cheng Xiaotao

Water Disaster Mitigation Center

China Institute of Water Resources and Hydropower Research, IWHR

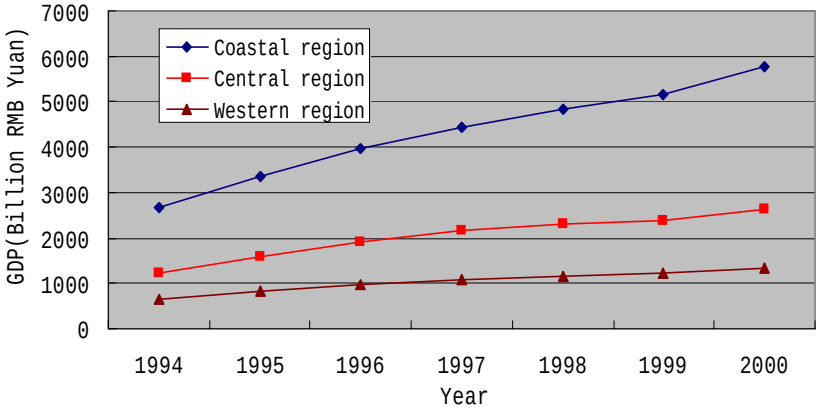
March 2003, Kyoto

Division of the economic regions in China



Rapid economic growth in China since 1980's
(China statistical annals,2001)

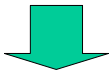
Population and properties increased rapidly in urbanized areas



Comparison of GNP Growth (1994---2000)
in three economic regions

Reconsidering the current flood control measures

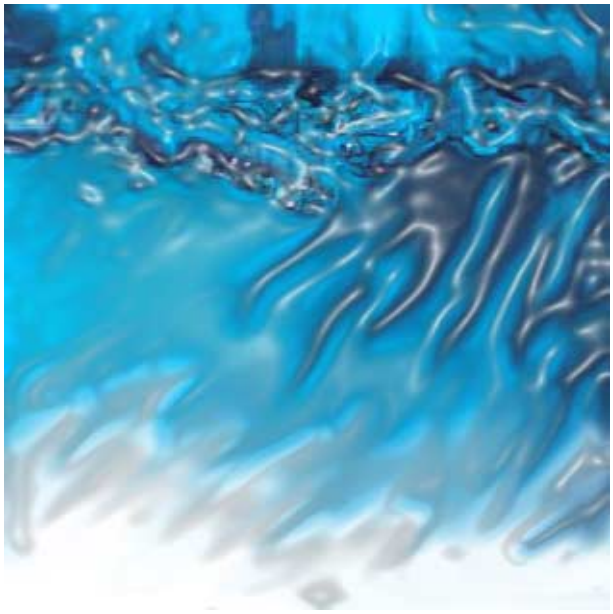
- Ensuring safety: high standard of flood protection
- Reducing damages: Restriction of economic development in flood detention areas



- Increased gap between Poor and Rich areas

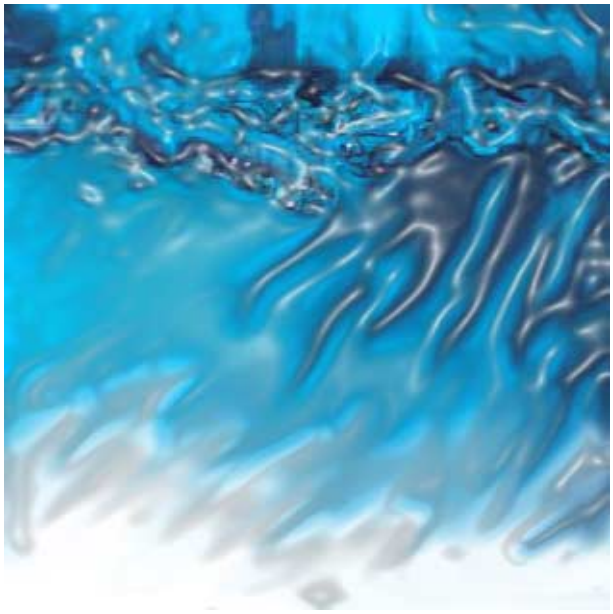
What kind of the flood management system should be established that is proper to reduce such gap between poor and rich areas ?

1.3　セッション記録



第 2 次水資源プロジェクト研究計画調査

(1)　セッションプラン



第 2 次水資源プロジェクト研究計画調査

Plan of Session

A. Session Time and Location

Day: March 18, 2003; Tuesday

Location: Kyoto International Conference Hall, Room D

Time: 12:30 to 15:15

Language: English

B. Session Purpose

The purpose of this session is to formulate appropriate means of reducing the vulnerability of the poor to the negative impacts of floods by drawing on lessons learned from international development cooperation in the Asian region; and from four regional workshops held on the subject of Poverty and Floods as part of the initiative for the 3rd World Water Forum.

C. Session Objectives

The objectives of this session are:

1. To examine the impacts of floods, both positive and negative, on people living in flood-prone areas taking into consideration the wide range of different geographic, climatic, socio-economic, and cultural conditions represented in the Asian region;
2. To examine the effectiveness of current flood protection and mitigation measures in terms of (i) higher and better use of natural resources within a river basin; (ii) enhanced economic development; (iii) improved living standards; and (iv) reduced flood hazard and risk for people living in floodplains;
3. To identify the best Asian regional practices for managing floods to mitigate their negative impacts and to enhance their positive impacts;
4. To provide basic concept for improved flood management with a view to reducing the vulnerability of the poor to floods;
5. To strengthen regional networks linking organizations responsible for formulating policies and practices concerned with flood management and poverty reduction.

D. Session Composition

The session comprises presentations of case studies from different Asian countries, each case study chosen to demonstrate good flood management practices based on mitigation of negative impacts and enhancement of positive impacts, particularly in relation to the poor. A panel discussion will follow the presentations to provide an opportunity for participants to raise questions and to enable expert representatives from different Asian regions to highlight important issues and recommendations. A wrap-up of the session will be made by the chairperson after the panel discussion to summarize the main findings and conclusions of the session.

The case studies were selected from among those presented in four regional consultation workshops organized by the session conveners in Bangladesh, Philippines, People's Republic of China (PRC), and Viet Nam. Panelists will be regional expert representatives selected by the conveners with the following recognized expertise:

- River Basin Management Specialist (Shun-ichi Maeda, JICA Expert for Water Resources Policy, Japan Ministry of Land, Infrastructure and Transportation)
- ODA Specialist (Senichi Kimura, Director, Japan International Cooperation Agency)
- Flood Management Specialist (Ian B Fox, Principal Project Specialist, Asian Development Bank (ADB))
- Flood and Drought Disaster Reduction Specialist (Cheng Xiaotao, Director, Water Disaster Mitigation Center, China National Institute of Water Resources and Hydropower Research (IWHR))

The Chairperson selected to preside over the panel discussion is Mr. Hidetomi Oi, Senior Advisor, Institute for International Cooperation, JICA.

E. Session Agenda

Agenda for Session on Poverty and Floods (18 March 2003)				
Time	**Duration (min)**	**Format and topic**	**Speaker/Participant**	Organization
12:30 – 12:40	10	Opening Remarks	Session Chairman	JICA
12:40 – 14:00	80	Presentation of 5 Case Studies	Presenters	MLIT, JICA and ADB
14:00 – 14:30	30	Panel Discussion on the theme of "Best practices to reduce the vulnerability of the poor to the negative impacts of floods"	Panel members from MLIT, JICA, ADB and IWHR (PRC)	MLIT, JICA, ADB and IWHR
14:30 – 15:00	30	General Discussion (Q&A)	Session participants and presenters	MLIT, JICA ADB and IWHR
15:00 – 15:15	15	Wrap-Up	Session chairperson	JICA

F. Session Case Study Presentations

The case studies to be presented at the session, selected from among the best presentations made at four regional Workshops held for the planning of the session, are as follows:

1. Flood Damage Restoration Works with Structures in Ormoc City, The Philippines;
2. Sustainable Management of the Brantas River Basin in Indonesia;
3. Flood Proofing and Livelihood Improvement in Bangladesh;
4. Lessons Learned from Operation of Flood Detention Basins in China;
5. Living with Floods in the Mekong River Delta of Viet Nam.

G. Session Plan

1. Opening Announcement

A representative of one of the convening organizations will make an opening announcement of the session and will introduce the Chairperson.

2. Chairperson's Functions and Address

(i) Introduction of panelists and case study presenters;

(ii) Explanation of the following topics:

- Purpose and objectives of the session;
- Positive and negative impacts of floods on the poor;
- Different flood management approaches adopted in accordance with different geographic, climatic, socio-economic, and cultural conditions
- Brief description of the case studies.

3. Presentation of Case Studies

(i) The case study from the Flood Damage Restoration Works with Structures in Ormoc City in The Philippines illustrates the necessity of rapid rehabilitation of flood control works following disastrous flash flooding in a steeply sloped river after torrential rain. The restoration was designed to provide protection from floods larger than what occurred in November 1991 that left 8,000 dead and missing. All construction works were completed in August 2001 and Ormoc City residents now enjoy relief from the threat of flash flood disasters; producing measurable local poverty alleviation, and contributing to the development of the regional economy.

(ii) The case study from the Sustainable Management of the Brantas River Basin in Indonesia, illustrates the effectiveness of flood protection and mitigation in promoting balanced regional development and its sustainable management system. It is a case study on how economic development contributed to poverty alleviation. The development project consisted of multipurpose dams, river improvement works, irrigation systems, drainage systems, and other mainly structural flood management measures. The focus of most newly built components of the project in recent years has shifted to non-structural measures,

including for example the integration and improvement of river basin management systems and the implementation of flood forecasting and warning systems to mitigate or to prevent future flood disasters.

(iii) The case study on the Flood Proofing and Livelihood Improvement in Bangladesh illustrates the importance of flood proofing as a complementary measure to structural flood protection to reduce risk and vulnerability of poor people. In Bangladesh floods are a recurring phenomenon that necessitates *living with floods* as a way of life. Most farmers have no other means of livelihood and are highly vulnerable to flooding. Flood mitigation projects include small-scale flood control works complemented by training and social support systems to generate new means of producing income; and improvement of living conditions through better primary health care, promotion of self-reliance, local participation in community decision making, and flood-proofing of houses. Poverty alleviation is an integral part of the project that builds on the participatory approach and includes self-managed savings and credit programs, cost-sharing, and institutional building.

(iv) The case study on “Lessons Learned from Operation of Flood Detention Basins in China” illustrates the potential for reducing the cost of flood control measures while also enhancing environmental conditions and the safety of poor people living in flood-prone areas. In the past 50 years traditional areas used for flood retention basins have been given over to agriculture, aquaculture, and many other types of rural development incompatible with the former nature of the natural wetlands of these flood control basins. The government is currently undertaking a major effort to reestablish 98 of these former wetland flood detention areas along the Changjiang River, Yellow River, Huai River, and the Hai River to store excess flood water volume and to reduce flood water peaks. The total area of these rehabilitated flood retention areas will be 35,000 sq Km with a natural storage area of 98 million cu m. The major problem facing the government in reestablishing these traditional flood retention basins is to mitigate the impacts of controlled flooding on the 18 million people currently living within these basins. This case study considers the government’s plans and actions to mitigate the impacts of this non-structural flood mitigation measure through development of the local economy, better flood management planning, construction of flood resistant infrastructure, and improvement of the capacity of local officials and households to recover from the negative impacts of controlled flooding within flood retention basins in the shortest period of time.

(v) The case study on “Living with Floods in the Mekong River Delta of Viet Nam” illustrates the benefits of the incorporation in flood management strategy of low-tech measures and traditional coping techniques to enhance safety and improve incomes in a large area subject to annual flooding lasting several months. One of the favored low impact options being developed for living with floods in moderate flooding areas is providing low cost loans to households to raise their individual houses on piles above the highest expected flood water level. Another strategy in deep flooding areas is to build elevated earthen homesteads above the highest flood water level for entire villages; either as satellite villages or as linear areas along flood evacuation roads. This case history describes the positive and negative perceptions of these and other non-structural methods for keeping people safe from annual flooding from the perspective of the flood impacted households themselves. Also discussed is the formulation of a self funding Water Disaster Self Reliant Fund to be used to provide the most disadvantaged individuals and households with means to resume their livelihood and for local government to recover from floods in the shortest possible period of time at the end of the cycle of annual flooding in the Mekong Delta.

4. Panel Discussion

The Panel will discuss the draft conclusions and recommendations of the session, together with the case study findings. Questions from participants, in the form of written questions on cards, will be accepted and responded to by the panelists. Conclusions will be incorporated into the draft Theme Paper on Poverty and Floods.

5. General Discussion

The chairperson will encourage discussion of the points raised and of the issues identified by the panel.

6. Wrap-Up of Summary and Conclusions

The chairperson will wrap-up the session by summarizing the main conclusions and recommendations, including any action plans proposed and agreed to by the session participants.

H. Session Participants

Title or function	Name	Title	Organization	Country	Contact e-mail
Chairman	Hidetomi OI	Senior Advisor	Institute for International Cooperation, JICA	Japan	Oi.hidetomi@jica.go.jp
Case study presenter-1	Bernardo P. Aman	OIC-Project Director	Project Management Office for Major Flood Control Projects, Department of Public Works and Highways	Philippines	
Case study presenter-2	Usman Rusfandi	President	Jasa Tira Public Corporation	Indonesia	pjt@malang.wasantara.net.id
Case study presenter-3	Md Zahangir Alam	Project Director	Local Government Engineering Department	Bangladesh	Ce-lged@bangla.net
Case study presenter-4	Jinchi Huang	Director	Flood & Drought Mitigation Center, China National Institute of Water Resources and Hydro Power Research (IWHR)	People's Republic of China	hjc@iwhr.com
Case study presentor-5	Dang Quang Tinh; and Pham Thanh Hang	Head, Standing Office of the Central Committee for Flood and Storm Control; and Programme Coordinator	Ministry of Agriculture and Rural Development; and United Nations Development Programme	Vietnam	dqtinh@dmu.netnam.vn hang@undp.org.vn
Panel member-1	Shun-ichi Maeda	JICA Expert for Water Resources Policy	MLIT	Japan	shunshun@cbn.net.id
Panel member–2	Senichi Kimura	Director	JICA	Japan	Kimura.Senichi@jica.go.jp
Panel member–3	Ian B. Fox	Principal Project Specialist	ADB	Philippines	ifox@adb.org
Panel member–4	Cheng Xiaotao	Director	Water Disaster Mitigation Center, IWHR	People's Republic of China	chengxt@iwhr.com

I. Draft Conclusions and Recommendations

[The following draft conclusions and recommendations were developed based mainly on case study presentations and discussions heard at the four regional workshops held to develop input to the 3rd World Water Forum session on Poverty and Floods. It is expected that these draft statements will be added to or modified through the case study presentations and discussions to be heard during the session on Poverty and Floods in Kyoto in March.]

Flooding, especially that experienced annually in many parts of Asia (including Bangladesh, Cambodia, India, Indonesia, Pakistan, Philippines, PRC, and Viet Nam), has both beneficial and harmful impacts. When the duration and depth of flooding are not excessive, floods rejuvenate wetlands forming the natural breeding grounds of diverse aquatic plants, fish and animals which are the fundamental sources of income and food for the poorest of the poor floodplain residents; and bring natural sediments and nutrients that are beneficial to agriculture. Floods also replenish surface reservoirs and groundwater basins, providing a reserve against dry season water shortages and drought. Such socio-economic benefits favorably impact on the society as a whole.

On the other hand, flash flooding, excessively deep flooding, and floods of long duration, can cause widespread suffering and severe household shocks, such as death by drowning of children and illness of income-producing adults. Such flooding exacerbates poverty by limiting access to income-earning activities, destroying vital infrastructure and services, and wiping out investments in agriculture, aquaculture, and personal property. These adverse impacts affect the poorest households most severely.

Although the complete elimination of flood disasters is impossible, flood damage can be mitigated through flood management which integrates considerations of integrated natural resources management, appropriate levels of economic development, reasonable levels of investment based on flood hazard, enhanced institutional capacity, and better opportunities for the poor to earn income. Specific recommendations for achieving effective flood management are as follows:

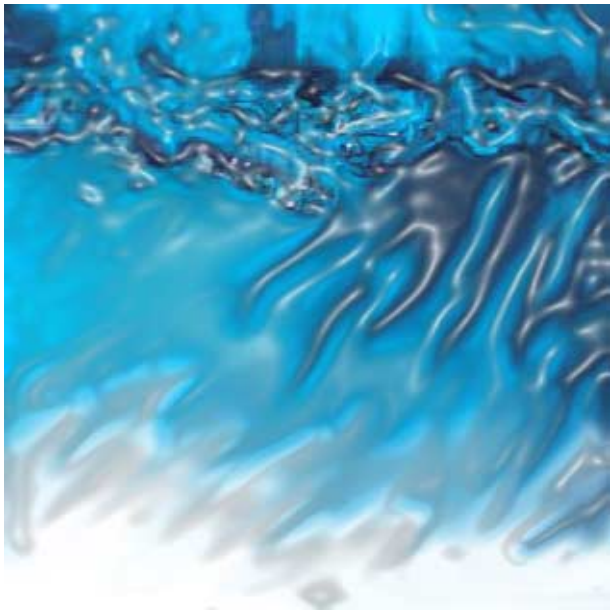
- All stakeholders, including both administrators and the general population which benefits economically, socially, and culturally from the water resources of a river basin, must have a say in how these resources are to be used and conserved. Both must also have a say in how floods should be managed to minimize their adverse impacts while also maximizing their beneficial impacts.

- Effective flood management requires a comprehensive approach that balances flood mitigation, environmental conservation, and sustainable utilization of available water resources for the benefit of all people of a nation.
- The preservation of life and the protection of the welfare of households should be given the highest priority in the design of flood protection works; flood proofing and emergency evacuation measures should accompany all structural interventions.
- The conception and design of flood protection should be based on careful analysis of risk so that the passage of greater-than-design floods can be managed in a predictable and safe way.
- Capacity building of organizations responsible for managing river basins and for raising public awareness through grassroots education for flood disaster preparedness is to be incorporated in all flood management programs as effective means of reducing risks and loss of life from floods.
- Flood containment to a high standard of protection is recommended for urban and other densely populated areas where the potential for ever larger flood induced losses is increasing due to population growth and to large investments in infrastructure and community services.
- Improper planning, design, construction, operation, maintenance, and repair of flood mitigation structures, such as reservoirs and embankments, may significantly increase the risk of floods. To preclude devastating damage caused by floods, relevant agencies should take such risks into account in the planning and design of facilities, and they should recognize the importance of providing appropriate construction, operation, maintenance, and repair.
- As much as possible, flood management should be designed and implemented to minimize adverse impacts on the natural condition in a river basin with optimum use made of balanced structural and non-structural approaches. Qualitative improvement and, where appropriate, quantitative improvement of flood mitigation and management are required to assure more substantial contribution to poverty reduction.
- Many communities have developed traditional means of coping with frequent, low-intensity floods; and flood mitigation projects implemented by governments should incorporate these traditional means where possible to minimize the adverse impacts of floods.
- There is scope in many parts of Asia to make houses less vulnerable to floods, to provide shelters from storm surges and unusually deep floods, and to

establish a network of evacuation roads for people and livestock. Similarly, in some parts of Asia, there is scope to use flood forecasting and warning systems. Where appropriate, such low-cost or low-impact flood mitigation measures should be adopted.

- There is also potential in parts of Asia to develop effective and affordable flood damage insurance for crops and property, and this should be used where suitable geographical and socio-economical conditions exist as a means of discouraging unreasonable levels of investment in flood-prone areas and of protecting the assets and livelihoods of persons living in these zones.

(2)　セッションレポート



第 2 次水資源プロジェクト研究計画調査

セッションレポート
(Session Report Submitted to The 3rd World Water Forum)

SESSION CODE: FLOD - 03	
Name of Convener(s): Japan Ministry of Land, Infrastructure and Transport (MLIT), Japan International Cooperation Agency (JICA), Asian Development Bank (ADB)	
DATE: **- March 18, 2003 (12:30-15:15)**	**Session Title:** **Poverty and Floods**
Contact information in Japan	**Accommodation:** **Toyoko Inn Gojo Kyoto**
	Contact No.: 090-1461-9869
	Contact E-mail: kawakami@ctii.co.jp
Reporter/Rapporteur: Marshall Silver	
Contact E-mail : marshallsilver@yahoo.com	

1. Key Issues

- Millions of people suffer from floods every year through loss of life, property, means of livelihood, social services and access to vital infrastructure. These adverse impacts affect the poorest segments of the society most severely
- Flood vulnerability of the poor has been increasing as a result of the cycle of population growth, environmental deterioration and the increase in the number of poor living in high flood risk areas
- The lack of capacity to limit the negative impact of floods remains a major burden for developing countries; mainly due to limited resources and the unlimited need for these resources to address pressing issues in all sectors of development
- Thus, despite achievements made to date, flooding has been increasing in terms of frequency, damage and vulnerability of the poor; aggravating poverty conditions and hampering the social and economic development of communities/regions/countries

2. Actions and Recommendations

- In the selection of projects, priority should be placed on projects, which will contribute more to poverty alleviation, by including “poverty alleviation” in the criteria for project selection.
- In the decision-making process of projects, opinions of the poor should be appropriately reflected, so as to minimize the adverse impact and to maximize the beneficial impact of the projects for the poor.
- Likewise, in the design of projects, livelihood improvement, job creation and other pro-poor elements should be considered, in order for the poor to benefit from the projects as much as possible.
- Different approaches should be adopted according to the conditions of flood prone areas: High

priority areas should be identified through regional and river basin planning for a high standard of flood protection; while in other areas providing protection of essential sources of livelihood, and maintaining the benefit of positive impacts from floods for agriculture, aquaculture, etc.

- The advantage of traditional means of coping with frequent, low-intensity floods developed by communities should also be considered.
- Flood vulnerability analysis should be the starting point of preparation and operation for flood mitigation and management plan.
- In view of the ever increasing vulnerability to floods in many countries, more resources should be allocated to flood mitigation and management projects of various types appropriate to local conditions.

3. Session Report to Plenary of Floods Group Presented by Mr. Marshall Silver

Poverty and Floods - 3rd WWF - Kyoto Japan - 18 March 2003

Summary

Main Topics Discussed:

- ❑ Millions of people suffer from floods every year through loss of life, property, means of livelihood, social services and access to vital infrastructure. These adverse impacts affect the poorest segments of the society most severely
- ❑ Flood vulnerability of the poor has been increasing as a result of the cycle of population growth, environmental deterioration and the increase in the number of poor living in high flood risk areas
- ❑ The lack of capacity to limit the negative impact of floods remains a major burden for developing countries; mainly due to limited resources and the unlimited need for these resources to address pressing issues in all sectors of development
- ❑ Thus, despite achievements made to date, flooding has been increasing in terms of frequency, damage and vulnerability of the poor; aggravating poverty conditions and hampering the social and economic development of communities/regions/countries

Main Points Raised at the Session on Poverty and Floods:

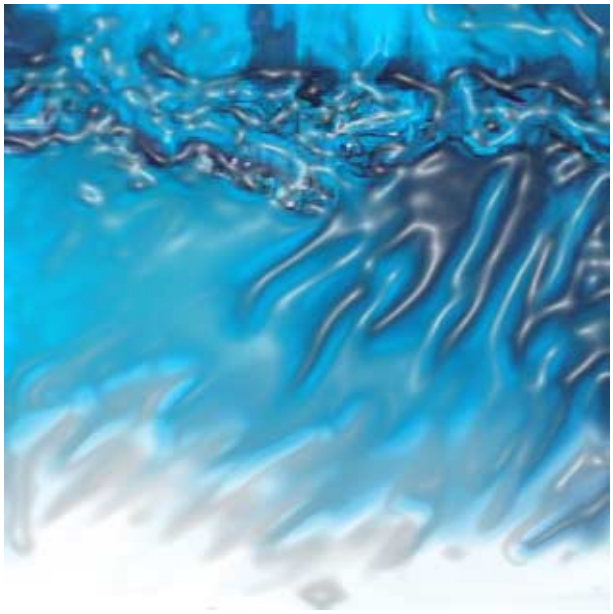
- ❑ Learning to "live with floods" based on local conditions - for both positive and negative impacts
- ❑ Better data collection and information gathering is needed to quantify impacts on the poor
- ❑ Capacity building at the grassroots for design, construction, operation and maintenance
- ❑ Preparedness, including capacity building, flood insurance and ongoing maintenance
- ❑ Appropriate structural measures together with non-structural measures
- ❑ From now to the next WWF, how much flood induced poverty do we plan to reduce

Poverty and Floods - 3rd WWF - Kyoto Japan - 18 March 2003

Conclusions/Recommendations to Reduce Poverty Caused by Flooding:

1. In the selection of projects, priority should be placed on projects, which will contribute more to poverty alleviation, by including "poverty alleviation" in the criteria for project selection
2. In the decision-making process for projects, the opinions of the poor should be appropriately reflected, to minimize the adverse impact and to maximize the beneficial impact of flood projects for the poor
3. Likewise, in the design of projects, improvement of livelihood, job creation and other pro-poor elements should be considered, in order for the poor to benefit from the projects as much as possible
4. Different approaches should be adopted for the poor according to the conditions of flood prone areas: High priority areas should be identified through regional and river basin planning for a high standard of flood protection; while in other areas providing protection of essential sources of livelihood, and maintaining the benefit of positive impacts from floods for agriculture, aquaculture, etc.
5. The advantage of traditional means of the poor for coping with frequent, low-intensity floods - developed by communities - should be considered
6. Flood vulnerability analysis should be the starting point of preparation and operation for flood mitigation and management plans, especially for the poor
7. In view of the ever increasing vulnerability of the poor to floods in many countries, more resources should be allocated to flood mitigation and management projects of various types appropriate to local conditions

(3)　パネリストや聴衆からの主なコメント



第 2 次水資源プロジェクト研究計画調査

パネリストや聴衆からの主なコメント

1. PANEL MEMBER'S COMMENTS

(1) Physical solutions for flood water drainage can change wetlands into productive agricultural land

- □ Results in the flood protected area are better transport, better housing, and less water-born diseases
- □ Hardened flood control channels are needed in highly urbanized, high value urban areas
- □ Baseline data is often lacking to show that flood control measures in alleviating poverty

(2) Message from JICA on Poverty and floods

- □ JICA strongly advocates poverty reduction in all water development projects
- □ Use more pro-poor approach to the development of assistance in the water sector

(3) Reducing the vulnerability of the poor to the negative impacts of floods

- □ Not all impacts of floods are negative, and structural solutions of scaling up small scale structural solutions are not always the best way to mitigate the impacts of catastrophic floods
- □ Engineering approach to flood control does not always work - due to changes in river morphology and the need for constant operation and maintenance, forever
- □ Crisis management is not the best way to deal with floods
- □ Movement upstream to bridge the gap between relief and recovery
- □ More preparedness can lead to flood crises that can be managed
- □ Maximize the beneficial impacts of floods, and conserve wetlands

(4) How to formulate appropriate means of reducing the vulnerability of the poor to floods

- □ The gap between poverty in different parts of a developing country can be extreme -
- □ What flood management strategy will have the ability to best reduce the gap between the rich and the poor

2. COMMENTS OF THE AUDIENCE ON THE DRAFT CONCLUSIONS OF THE SESSION

(1) Appropriate Government policies are not always in place to mitigate the impact of floods

- The poor most often live in marginal areas such as in the flood plains of rivers
- Such policy is often concerned with land use and land tenure in flood prone areas
- The recommendation for Government control of changing land use modes should be a strong outcome of the session

(2) There should be targets established for reducing the impacts of floods on poverty

- From now to the next WWF, how much flood induced poverty do we plan to reduce
- We should make efforts to better clarify and quantify the economic impacts of floods on the poor through better data collection and information gathering

(3) How do we enhance the ability of the poor to maximize the positive benefits that can be achieved from floods

(4) The poor, and all other stakeholders must participate in decision making on how to mitigate the impact of floods

- The participatory approach must be fundamental in project preparation
- The poor must be involved in the planning implementation, and management of flood control programs and projects
- All flood mitigation methodologies must have a strong component for sustainability for the continued success of community based disaster management schemes

(5) Better knowledge of the source of flooding should be a recommendation of the session

- What is the impact of river morphology on the severity of flooding
- What are the environmental causes that are increasing the frequency and magnitude of floods

(6) Non-structural methods of flood preparedness should be stressed over structural methods of flood control

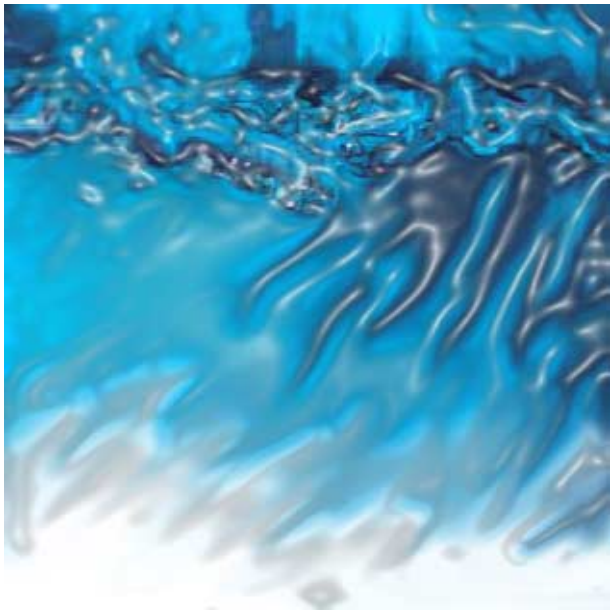
(7) Knowledge of the biological impacts of a flood are an important issue for the poor

(8) More lessons learned should be presented for the case study examples

(9) The panel should endorse the reclamation of prior wetlands by the poor as a non-structural measure of flood mitigation and as a self help method for the alleviation of poverty through work

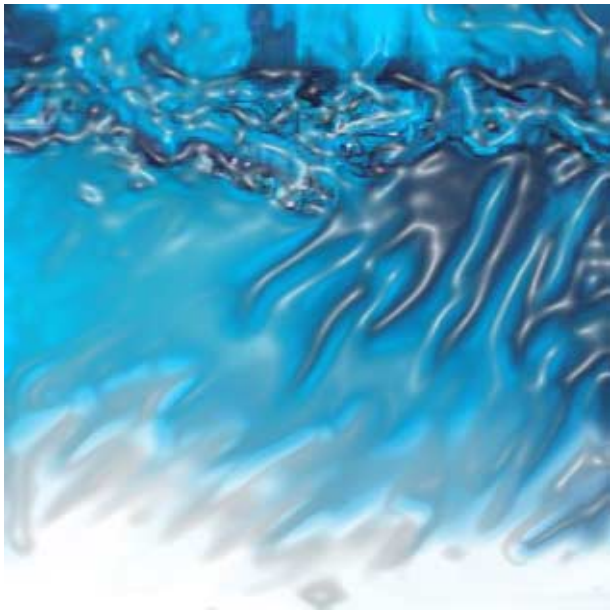
(10) Lessons learned from the case studies should be incorporated into national disaster management and development policies

1.4　その他資料



第 2 次水資源プロジェクト研究計画調査

(1)　JICA の洪水関連活動



第 2 次水資源プロジェクト研究計画調査

Activities of JICA on Poverty Alleviation and Flood Disaster Mitigation

The 3rd World Water Forum

Session: Poverty and Floods
March 18, 2003, 12:30 - 15:15
Kyoto International Conference Hall, Japan

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

1. INTRODUCTION

The Japan International Cooperation Agency (JICA) has been fighting on many fronts to reduce poverty in developing countries with the ultimate goal of achieving "people-centered development" that focuses on the lives and welfare of individual human beings, not just economic growth.

Extracting knowledge from Japan's experience that projects for flood control contributed to better living for the poor, flood control projects can be designed to improve livelihood and create jobs for the poor. JICA has provided assistance to the poor with many flood control mitigation programs which have a balance with structural and non-structural measures.

This paper describes the activities of JICA on the poverty alleviation and flood disaster mitigation.

Section 2 of this paper gives a brief description of JICA. The performance of JICA on poverty alleviation and flood disaster mitigation are discussed respectively in Sections 3 and 4. JICA's contribution to poverty alleviation and flood disaster mitigation throughout the world is exemplified in three case studies or projects as presented in Section 5. Goals and recommendations on flood control programs implemented in the future are given in Section 6, while the conclusion is in Section 7.

2. WHAT IS JICA

Japan under its Official Development Assistance (ODA) presently stands as the major donor to 25 developing countries in their quest for socio-economic development. The provision of economic cooperation is based on the concepts of "humanitarian and moral considerations" and "the recognition of interdependence among nations."

There are three main categories of Japan's ODA, namely:

(1) Contribution and subscription to multilateral donor organization;

(2) Bilateral Loan (generally known as "Yen Loan"); and

(3) Bilateral Grant.

Bilateral grants are mostly provided through the Japan International Cooperation Agency (JICA), which was established in 1974. JICA is responsible for the implementation of technical cooperation and the support for grant-aid cooperation programs of the Japanese Government.

JICA has been providing developing countries with assistance for poverty alleviation and flood disaster mitigation through technical cooperation and the support for grant-aid cooperation.

Figure-1 Poverty Dwelling on Riverbank

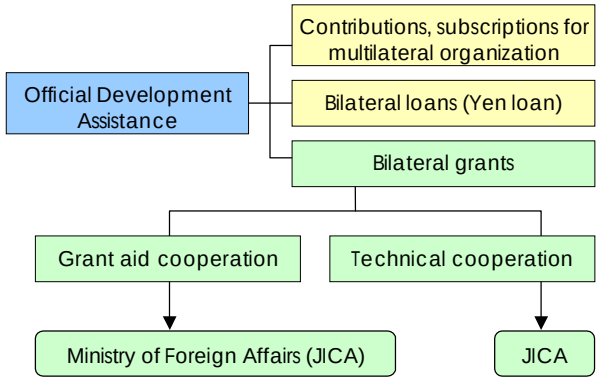


Figure-2 Responsibility of JICA under ODA

3. PERFORMANCE OF JICA ON POVERTY ALLEVIATION

3.1 POVERTY IN THE WORLD

There are 1.3 billion people living in poverty in the world at present. This translates to 1 person in 5 of the overall world's population, and 1 person in 3 in developing countries. Statistics compiled by the World Bank reveal that 520 million of these people are in Southeast Asia.

In 1996, the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD) issued a strategy entitled "Shaping the 21st Century" that established the specific goal of "reduction by one-half in the proportion of people living in extreme poverty by 2015."

3.2 POVERTY ALLEVIATION BY JICA

Since the beginning of the 1990's, JICA has been conducting activities to support poverty reduction. To promote its anti-poverty measures directly, JICA established the "Community Empowerment Program or Grassroots Technical Cooperation Project" in FY 1997 to serve as the framework of cooperation on poverty reduction to benefit the local residents.

Figure-3 Poverty Alleviation

Under this initiative, JICA and NGOs cooperate at the regional level and through this collaboration, JICA has implemented a large number of projects designed to meet the needs of local communities. In addition, some 2000 members of the Japan Overseas Cooperation Volunteers (JOCV) have been dispatched since 1965 at any given time throughout the world. These volunteers are engaged in a variety of grass-root activities with the participation of local residents.

4. PERFORMANCE OF JICA ON FLOOD DISASTER MITIGATION

4.1 FLOOD DISASTERS IN THE WORLD

Flood disasters accounted for one-third of the natural disasters in the world in 1987-1997. Death due to natural disasters has been estimated at about 390,000 for the past 10 years, and 60% of these were caused mainly by floods. Socio-economic conditions, therefore, have suffered seriously from floods, and 40 to 50 percent of those floods and 70 to 90 percent of the dead had occurred in the Asian countries.

Furthermore, vulnerability to floods has aggravated, and additionally, poverty population has increased in flood hazard areas. The vicious cycle of population growth, environmental deterioration and poverty, as well as the widening cleavage between rich and poor, has become the cause of perennial flood disasters.

While no country is entirely safe against any flood disaster, developing countries in particular lack the capacity to prevent and prepare for it. Floods bring miseries to many developing countries, especially in Asia and specifically to the poorest and marginalized people who live in vulnerable, flood disaster areas.

There are some reasons why Asia is leading in flood damage, such as:

(1) The geological conditions, which are unstable due to the frequent earthquakes, volcanic movements and faults in topography;

(2) The monsoon and typhoon rains, which trigger adverse disastrous events like floods and landslides;

(3) The short and steep rivers in Asia, which cause flush floods;

(4) The rapid urbanization, which causes the increase of flood runoff volume and peak discharge; and

(5) The population increase and concentration in flood prone areas.

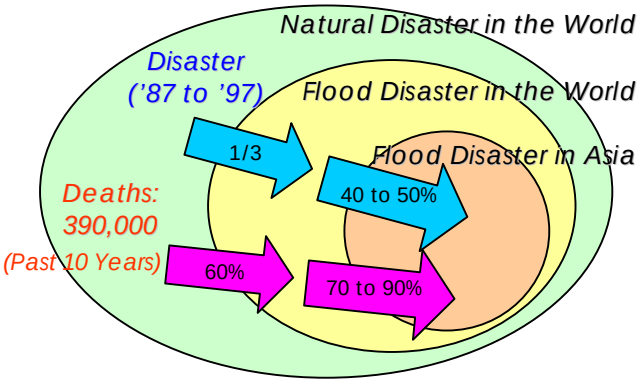


Figure-4 Flood Disasters in the World

4.2 FLOOD DISASTER MITIGATION BY JICA

The performance of JICA concerning flood-related issues had increased due to the increase of flood disasters in developing countries for some reasons. Many poor families stay in flood prone areas, such as low-lying floodplains, river valleys regularly hit by flash floods, unstable steep lands and malaria-infested marshes. Flood disasters force people further into poverty, and poverty leads to chronic vulnerability to flood disasters in developing countries. Therefore, flood disaster mitigation is closely concerned in poverty alleviation.

JICA has been extending technical cooperation and the support for grant-aid to the developing countries with flood mitigation projects. Since 1974, JICA had carried out 292 flood-related studies/projects under the schemes of development study, support for grant-aid program, and project-type technical cooperation.

The figure below shows the 5-year trend of these schemes in Asia, Central/South America, Africa and other countries. All schemes show an increasing trend due to the increase of flood disasters around the world. The 5-year trend presents a higher performance in Asia, while the schemes in Central/South America and Africa cover 30% in the latest 5 years from 1996 to 2000.

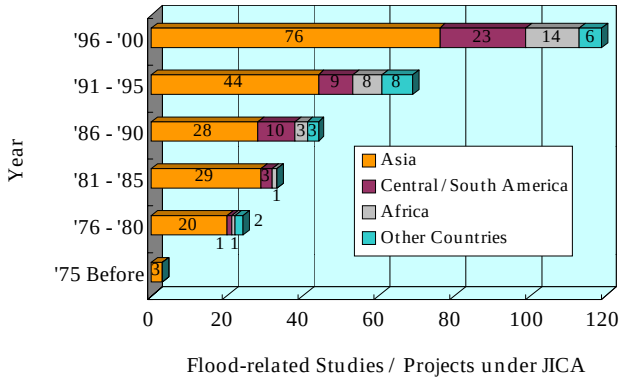


Figure-5 Flood Disaster Mitigation by JICA

4.3 THE TREND OF NON-STRUCTURAL FLOOD CONTROL MEASURES

Flood control measures are classified into structural and non-structural measures. Typical structural flood control measures are dams and storage reservoirs, embankment of levee, channel improvement, floodway bypass and so on. On the other hand, non-structural measures include land-use control, flood forecasting and warning, evacuation drills, publication of hazard maps, relief activities, flood insurance and so on.

Non-structural measures are required when the following cases exist:

(1) Structural measures are costly or not feasible, considering the Benefit-Cost ratio;

(2) Financial constraint of the local government; and

(3) The execution of structural measures is time-consuming.

Ideally, a combination of structural and non-structural measures is required for effective flood control, and JICA has been adopting both structural and non-structural measures to mitigate flood disasters. From 1975 to the 1980's, structural measures accounted for more than half of the flood-related projects implemented.

Non-structural measures prevailed in the 1990's and they cover more than half of the flood-related projects recently implemented. On the contrary, the annual average number of structural measures has not changed since the 1980's, so that the increase in the total number of projects is attributable to the increase of non-structural measures.

5. JICA'S FLOOD CONTROL STUDIES/PROJECT THAT CONTRIBUTE TO POVERTY ALLEVIATION

Case-1: Comprehensive River Basin Development

The comprehensive river basin development project in Brantas, East Java, Indonesia, is a case of economic development that contributes to poverty alleviation. JICA had provided assistance for the development of the target area for more than 40 years since the period of OTCA (Overseas Technical Cooperation Agency), the original organization of JICA. The development projects consisted of multipurpose dams, river improvement works, irrigation systems, drainage systems and so on, which can be defined as structural measures.

Recently, however, the focus of projects has shifted to non-structural measures. For example, JICA now undertakes the integration and improvement of river basin management systems and the implementation of flood forecasting and warning systems to mitigate flood disasters.

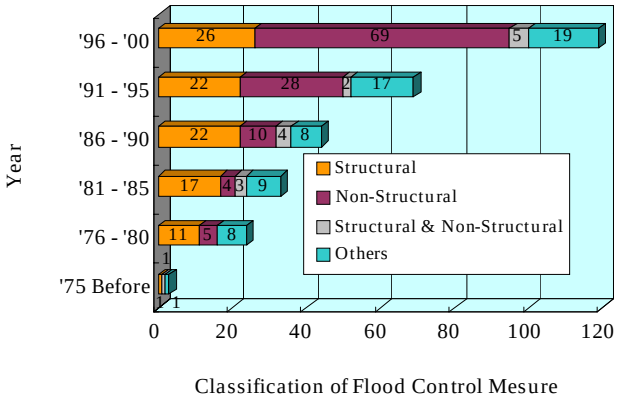


Figure-6 Trend of Non-Structural Flood

Figure-7 Wlingi Dam

Figure-8 Karangkates Dam Power Station

Figure-9 Brantas River Basin

Figure-10 Lodoyo Irrigation Canal

During their long history of implementation, the projects have produced benefits, such as the increase of safety level against floods to a 50-year return period, electricity production of about 1.0 billion kWh per year, irrigation of 340,000 hectares of land, raw water supply of around 300 million m^3 per year for drinking water and industries, tourism and so on. These economic growth benefits have tremendously contributed to poverty alleviation.

Case-2: Post-Disaster Restoration Project

The flood control project in Ormoc City in the province of Leyte, Philippines, is a typical case of a post-disaster restoration project. The project's objective was to develop the area by providing protection against floods larger than the one that took place in Ormoc in November 1991 accounting for 8,000 deaths and missing.

Prompt relief activities were initiated by the City Government of Ormoc, which was later on joined by other agencies of the central government, several Red Cross units, private entities, and many countries including the Government of Japan. As reported, donation from the different agencies reached a total of US$ 5.8 million.

However, the threat of disastrous floods and the proliferation of people living along the rivers as well have not been removed. Therefore, from 1993 to 1994, a feasibility study was conducted by JICA for a flood control project in Ormoc City that will provide protection against a flood larger than the one in 1991.

With grant-aid from the Government of Japan, basic and detailed design works were carried out through JICA, and all construction works were completed in August 2001. The residents of Ormoc are now relieved from the threat of flood disaster and this

contributes to the development of the regional economy and the alleviation of poverty as well.

Figure-11 Flood Situation

Figure-12 Post River Improvement

Case-3: Flood Disaster Mitigation Focusing on Poverty

Flood is a recurring phenomenon in Bangladesh. People in that country practically live with floods. Since farmers have no other means of livelihood apart from farming, they are very vulnerable to flood damage.

This case is a study on a rural development project involving flood proofing, which was implemented in perennially flooded areas of Bangladesh with the assistance of JICA. The project was especially directed towards poverty alleviation.

Flood mitigation projects in these areas require small-scale flood control programs due to financial constraint. Also, they require social approaches such as support to generate other means of income through training and education, improvement of living conditions through primary health care promotion, promotion of the idea of self-reliance and participation in the projects, and so on. Thus, the JICA study team formulated an integrated rural development plan, targeting small-scale flood mitigation and poverty alleviation.

Furthermore, to ensure the sustainability of the proposed projects, participatory approach, self-managed savings and credit programs, cost-sharing and institutional building were proposed.

Figure-13 Flood Disaster Mitigation Focusing on Poverty

Figure-14 Participatory Approach in Rural Development Projects

6. RECOMMENDATIONS ON FUTURE FLOOD CONTROL PROGRAMS

6.1 GOAL OF FLOOD DISASTER MITIGATION PROGRAM

Flood is still a major concern in the world, especially in Asia as explained before. Poor people dwelling in flood-prone areas and in flood hazard riverbanks are very vulnerable to disastrous floods.

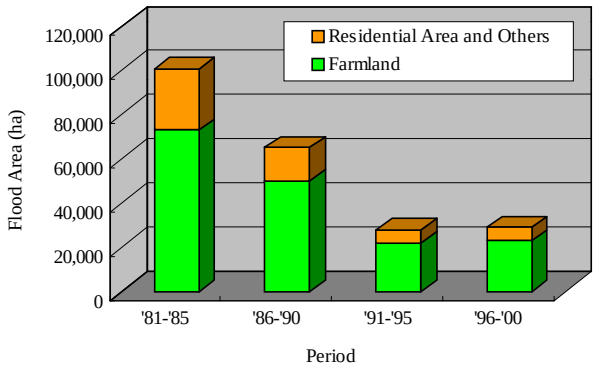
Two major goals of a flood disaster mitigation program are economic development and living condition improvement for inhabitants. Relieving the inhabitants of a river basin from the threat of devastating floods will contribute to the development of the regional economy and thus improve living conditions leading to the alleviation of poverty.

6.2 FLOOD DISASTERS IN JAPAN

For the realization of flood disaster mitigation in developing countries, the effectiveness of flood control in Japan is cited as an example.

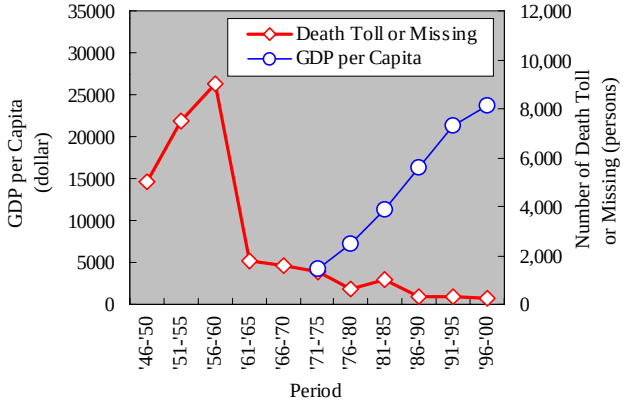
Figure 15 shows that the flooded areas in Japan have been decreasing in every 5 years because flood control projects were implemented since 1981.

On the other hand, Figure 16 presents the 5-year trend of Number of Missing and Deaths and Gross Domestic Product (GDP) per Capita in US dollars. The number of deaths or missing due to floods has been decreasing since 1960 because of the serious efforts on flood control. The flood control projects have contributed to the stability of livelihood and socio-economic development, which caused the increase of GDP per Capita from 1970 as graphically shown below. The growth of GDP per capita may have contributed to the increase of investment on flood control.



Source: Statistics of Floods, Ministry of Land, Infrastructure and Transport, Japan, 2001

Figure-15 Trend of Flood Area



Source: Statistics of Floods, Ministry of Land, Infrastructure and Transport, Japan, 2001

Figure-16 Trend of Number of Deaths or Missing and GDP per Capita

6.3 METHODS OF IMPLEMENTATION OF FLOOD DISASTER MITIGATION PROGRAMS

Some methods of implementation of flood disaster mitigation programs have contributed to poverty alleviation. For example, comprehensive river basin development ranging from flood control to hydropower development, supply of water for domestic and industrial uses, and irrigation, like the case of river basin management in Indonesia, are effective measures for the development of the regional economy.

Structural flood control measures, such as the case in the Philippines, are still in great demand and produce direct effects to the socio-economic activities in flood hazard areas.

These projects are the typical or conventional measures so far adopted to meet the demand of developing countries, and they promote economic development as well as the improvement of living conditions, further contributing to poverty alleviation. Moreover, structural flood control projects by riverbank improvement are getting uneconomical and unrealistic, considering the financial constraints in developing countries and also the resettlement issues involving many informal dwellers on the riverbanks due to the widening of river channels. Comprehensive flood control projects or the effective combination of structural and non-structural flood control measures should be proposed and implemented.

6.4 CHALLENGE TO NEW TYPE OF FLOOD DISASTER MITIGATION METHOD

There is a new point of view or trend, namely, the Integrated Small-Scale Flood Control and Poverty Alleviation Project like the case in Bangladesh. This trend focuses on poor people as the target and main participant, as well as the recipient, of the project.

The idea of flood mitigation that allows inundation to some extent but protects essential parts of livelihood is getting to be a more preferable solution to the increasing flood damages.

Key elements of these types of projects are: 1) participation of local people in order to establish the sense of ownership; and 2) assistance to the poor to enable them get out of the vicious cycle of widespread poverty by providing choices of means of livelihood.

Thus, it will be required to challenge a new type of integrated development plan, in both rural and urban areas, that could handle poverty problems together with flood mitigation in the 21st century.

6.5 REPORT OF WORKSHOP ON WATER AND POVERTY IN DHAKA

The Asia-Pacific Regional Consultation Workshop on Water and Poverty was held in Dhaka, Bangladesh, on September 22-26, 2002.

Figure-17 Workshop on Water and Poverty in Dhaka

Some of the recommendations concerning poverty alleviation are listed below. These recommendations could be useful and adaptable to future flood control projects that aim to contribute to poverty alleviation.

(1) Demand-driven approach should be provided for the poverty alleviation programs, where the poor themselves set the agenda and define the priorities.

(2) Participatory approach is an agreed mechanism to make clear the needs, interests and priorities of the poor.

(3) Partnerships are a key element for all stakeholders to play a role in poverty alleviation effectively.

(4) Equity, with a gender focus, is the core of approach, both as an objective and as a key element of poverty alleviation.

(5) Well-planned investment is a core component of required pro-poor actions.

(6) Development of institutional capacities is indispensable for the different needs and options that could be identified and turned into practical steps for the sustainable poverty reduction.

(7) Transparency of information and shared understanding are essential for creating partnerships and harmonizing the potentials of different stakeholders to the common purpose of decreasing poverty.

6.6 REPORT OF WORKSHOP ON POVERTY AND FLOOD IN MANILA

The Regional Consultation Workshop on Poverty and Floods was held in Manila, Philippines, on October 17 - 19, 2002.

Figure-18 Workshop on Poverty and Flood in Manila

Some of the findings and recommendations on poverty and floods are listed below.

(1) Flood disaster is a fundamental problem in flood prone areas. Without proper flood mitigation and management, any effort on poverty reduction will not be successful.

(2) Structural measures in mitigating floods are effective in contributing to the enhancement of socio-economic conditions of people benefiting from the project. In order to obtain the maximum benefit on equitable and sustainable basis for the people, it is recommended to:

- Adopt the comprehensive approach, integrating flood mitigation and management with water use and environmental conservation, and also combining hard and soft measures;
- Adopt the basin approach with the whole basin as a unit even for international basins and involving all stakeholders.

(3) In order to ensure flood mitigation and the management of projects to be more effective for poverty reduction, it is recommended to:

- Incorporate social programs into the project as much as possible, or directly target the poor with poverty reduction as the primary objective of the project.
- Give priority to poorer areas in the selection of project sites.
- Carry out socio-economic studies in order to address poverty issues more effectively.

(4) Other important issues mentioned particularly include the importance of information in various aspects, such as:

- Information sharing among stakeholders and among countries in case of international river basins for cooperation in equitable water development and use. The proposed IFNet (International Flood Network) will surely contribute to flood damage mitigation through organizing cooperation among a wide range of

stakeholders all over the world.

- Information dissemination especially at the time of disaster emergency to the bottom level that need such information the most in an understandable way through the combination of IT technology and indigenous system.
- Flood hazard mapping, which is necessary as a prerequisite to all disaster management activities such as relief operation, preparedness and mitigation.
- Topics focused at the Bangladesh workshop such as participatory approach, partnership with all stakeholders, institutional and human capacity building, and gender consideration.

It was learned from the workshop that:

(1) There is a tendency both in governments and donors that the approach of flood mitigation and management projects is shifting from the traditional one, which primarily aims at economic development of the target area, to a new one in which the project includes components in favor of or directly targeting the poor.

(2) In spite of the success of flood mitigation and management projects in mitigating flood disasters and in achieving economic development of target areas, poverty incidence has not always been reduced. This indicates that a flood mitigation and management project is a necessary condition but not a sufficient condition for poverty alleviation that is exacerbated by the continuous inflow of poor people into the target areas.

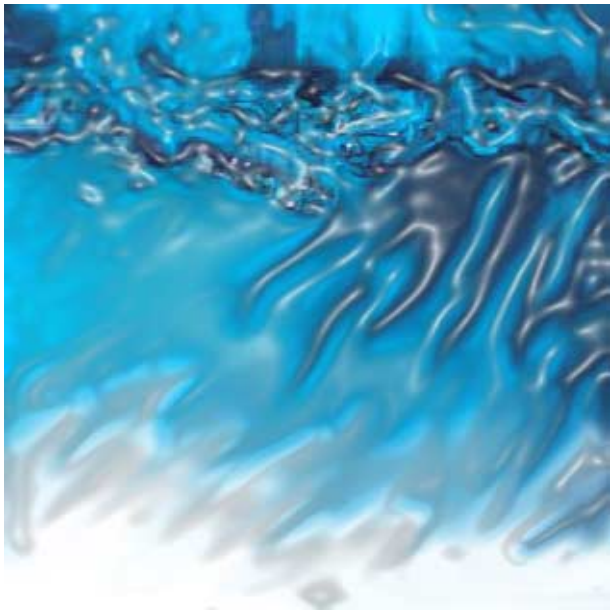
7. CONCLUSION

The activities of JICA on flood disaster mitigation have been expanding from engineering measures, such as river improvement, to non-engineering measures, such as pro-poor development assistance. Considering the significance and magnitude of poverty issues in developing countries, coordinated activities among multilateral and bilateral agencies, private sectors, government agencies concerned, NGOs and local communities are needed. In this regard, JICA will further cooperate with these entities to assist developing countries in promoting their economic development, improving the living environment, and alleviating poverty.

This report is expected to serve as effective information for the Third World Water Forum in Kyoto, Japan.


JAPAN
INTERNATIONAL
COOPERATION
AGENCY

(2)　「洪水貧困」セッション宣伝チラシ



第 2 次水資源プロジェクト研究計画調査

SESSION INFORMATION
セッションのご案内

POVERTY AND FLOODS
貧困と洪水について考える！

Theme	:	Floods	テーマ	: 洪 水
Session	:	Poverty and Floods	セッション	: 貧困と洪水
Time	:	12:30-15:15, March 18	日 時	: 3 月 18 日 12 時 30 分～15 時 15 分
Venue	:	Room D, Kyoto International Conference Hall	場 所	: 京都国際会館 会議場 D
Convening Organizations	:	The Ministry of Land, Infrastructure and Transport, Japan (MLIT)	主 催	: 国土交通省
		Japan International Cooperation Agency (JICA)		国際協力事業団
		Asian Development Bank (ADB)		アジア開発銀行

Purpose 目 的

The purpose of this session is to discuss appropriate means of reducing the vulnerability of the poor to the negative impacts of floods by drawing on lessons learned from international development cooperation in the Asian region.

このセッションでは、アジア地域における国際協力の事例を通じて、貧困層に対する洪水被害の適切な軽減方法について話し合います。

Session Program セッションプログラム

Opening Remarks	12:30 – 12:40	**開 会**
Presentation of 5 Case Studies	12:40 – 14:00	**事例発表**
Panel Discussion on the theme of "Best practices to reduce the vulnerability of the poor to the negative impacts of floods"	14:00 – 14:30	**パネルディスカッション**
General Discussion (Q&A)	14:30 – 15:00	**質疑応答**
Wrap-Up	15:00 – 15:15	**閉 会**

Presentation of 5 Case Studies 事例発表

(i) Flood Damage Restoration Works with Structure in Ormoc City, the Philippines

川沿いに暮らす貧困層へ与えた大きな洪水被害の再発防止対策事業
– フィリピン国オルモック市の事例

(ii) Sustainable Management of the Brantas River Basin, Indonesia

貧困軽減に効果のある流域開発を行い、さらに、持続可能な流域管理計画を策定
– インドネシア国ブランタス川流域管理の事例

(iii) Flood Proofing and Livelihood Improvement, Bangladesh

貧困層の生計改善策と洪水被害軽減策を一体として計画
– バングラディシュ国の事例

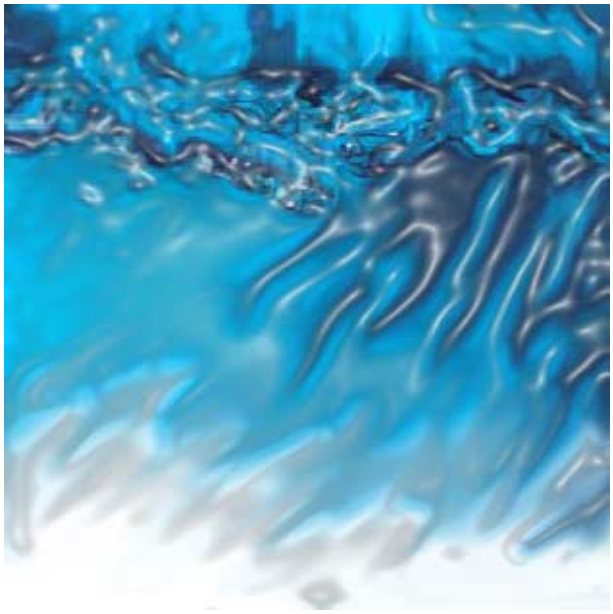
(iv) Lessons Learned from Operation of Flood Detention Basins on the Yellow River in China

遊水池を効果的に活用し、事業費の削減を図り、貧困層を含む地域の財政負担を軽減
– 中国黄河流域の事例

(v) Living with Floods in the Mekong Delta of Viet Nam

河川氾濫水を農業や漁業へ有効に活用すると共に、氾濫被害軽減を図り、洪水と共生する
– ヴェトナム国メコンデルタの事例

(3) 写 真



第 2 次水資源プロジェクト研究計画調査

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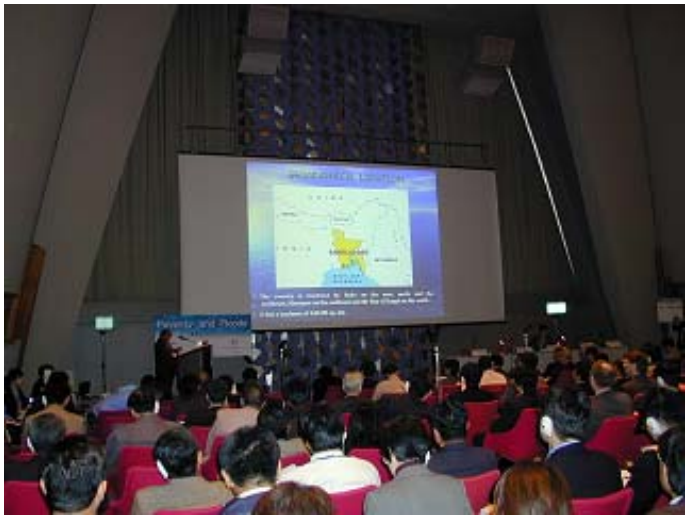

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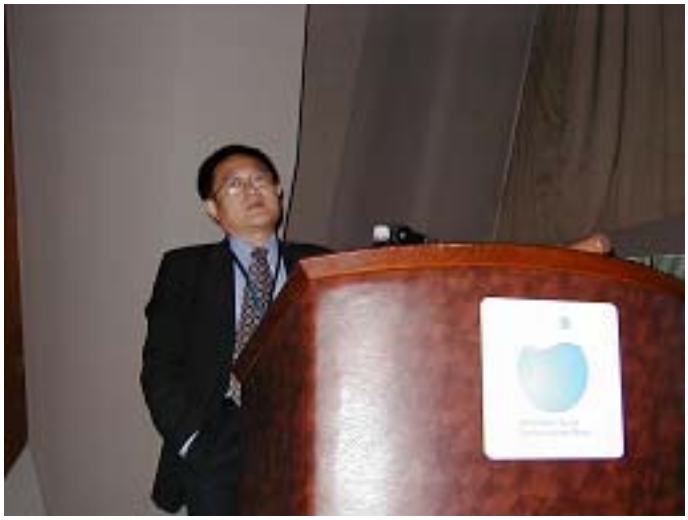

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写真- 9　Dang Quang Tinh 氏によるケーススタディの発表

写真- 10 Pham Thanh Hang 氏によるケーススタディの発表

写真- 11 大井議長による発表

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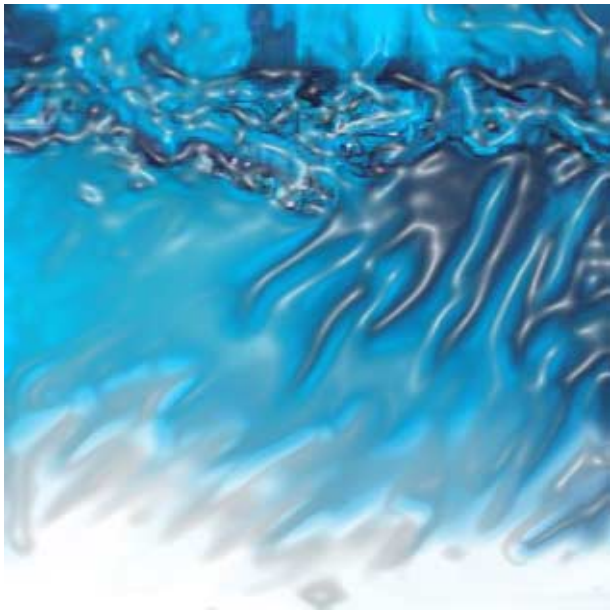


第 2 次水資源プロジェクト研究計画調査

POVERTY AND FLOODS
貧困と洪水について考える!

Theme	: Floods	テーマ	: 洪 水
Session	: Poverty and Floods	セッション	: 貧困と洪水
Time	: 12:30-15:15, March 18	日 時	: 3 月 18 日 12 時 30 分～15 時 15 分
Venue	: Room D, Kyoto International Conference Hall	場 所	: 京都国際会館 会議場 D
Convening Organizations	: The Ministry of Land, Infrastructure and Transport, Japan (MLIT)	主 催	: 国土交通省
	Japan International Cooperation Agency (JICA)		国際協力事業団
	Asian Development Bank (ADB)		アジア開発銀行

Purpose 目 的

The purpose of this session is to discuss appropriate means of reducing the vulnerability of the poor to the negative impacts of floods by drawing on lessons learned from international development cooperation in the Asian region.

このセッションでは、アジア地域における国際協力の事例を通じて、貧困層に対する洪水被害の適切な軽減方法について話し合います。

Session Program セッションプログラム

Opening Remarks	12:30 – 12:40	**開 会**
Presentation of 5 Case Studies	12:40 – 14:00	**事例発表**
Panel Discussion on the theme of "Best practices to reduce the vulnerability of the poor to the negative impacts of floods"	14:00 – 14:30	**パネルディスカッション**
General Discussion (Q&A)	14:30 – 15:00	**質疑応答**
Wrap-Up	15:00 – 15:15	**閉 会**

Presentation of 5 Case Studies 事例発表

(i) Flood Damage Restoration Works with Structure in Ormoc City, the Philippines

川沿いに暮らす貧困層へ与えた大きな洪水被害の再発防止対策事業
– フィリピン国オルモック市の事例

(ii) Sustainable Management of the Brantas River Basin, Indonesia

貧困軽減に効果のある流域開発を行い、さらに、持続可能な流域管理計画を策定
– インドネシア国ブランタス川流域管理の事例

(iii) Flood Proofing and Livelihood Improvement, Bangladesh

貧困層の生計改善策と洪水被害軽減策を一体として計画
– バングラディシュ国の事例

(iv) Lessons Learned from Operation of Flood Detention Basins on the Yellow River in China

遊水池を効果的に活用し、事業費の削減を図り、貧困層を含む地域の財政負担を軽減
– 中国黄河流域の事例

(v) Living with Floods in the Mekong Delta of Viet Nam

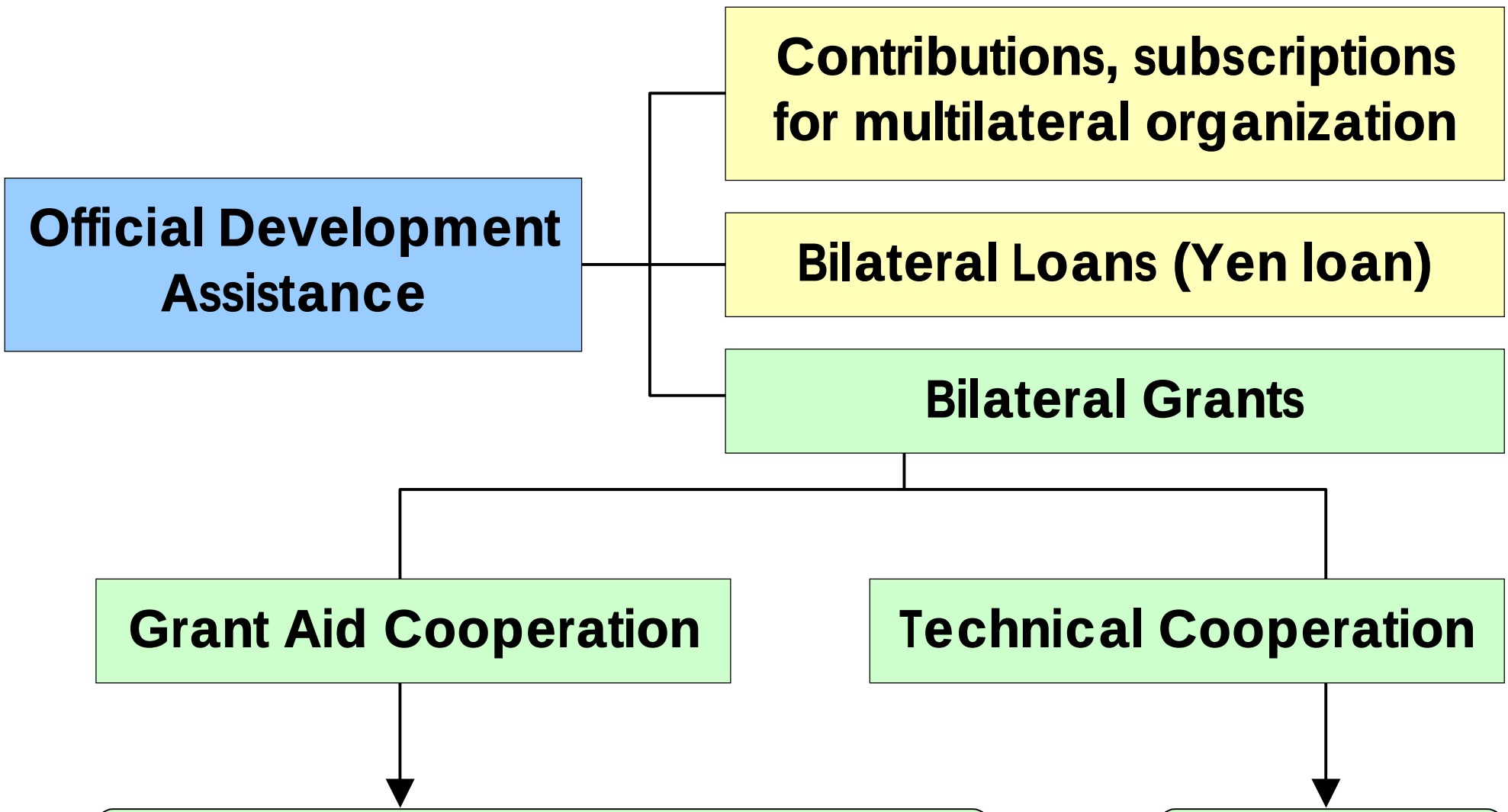
河川氾濫水を農業や漁業へ有効に活用すると共に、氾濫被害軽減を図り、洪水と共生する
– ヴェトナム国メコンデルタの事例

ACTIVITIES OF JICA ON POVERTY ALLEVIATION AND FLOOD DISASTER MITIGATION

JAPAN INTERNATIONAL COOPERATION AGENCY

RESPONSIBILITY OF JICA UNDER JAPAN'S ODA

Bilateral grants are mostly provided through the Japan International Cooperation Agency (JICA), which was established in 1974. JICA is responsible for the implementation of technical cooperation and the support for grant-aid cooperation programs of the Japanese Government.



Responsibility of JICA under Japan's ODA

JAPAN INTERNATIONAL COOPERATION AGENCY

POVERTY IN THE WORLD

There are 1.3 billion people living in poverty in the world at present.

This translates to 1 person in 5 of the overall world's population, and 1 person in 3 in developing countries.

Statistics compiled by the World Bank reveal that 520 million of these people are in Southeast Asia.

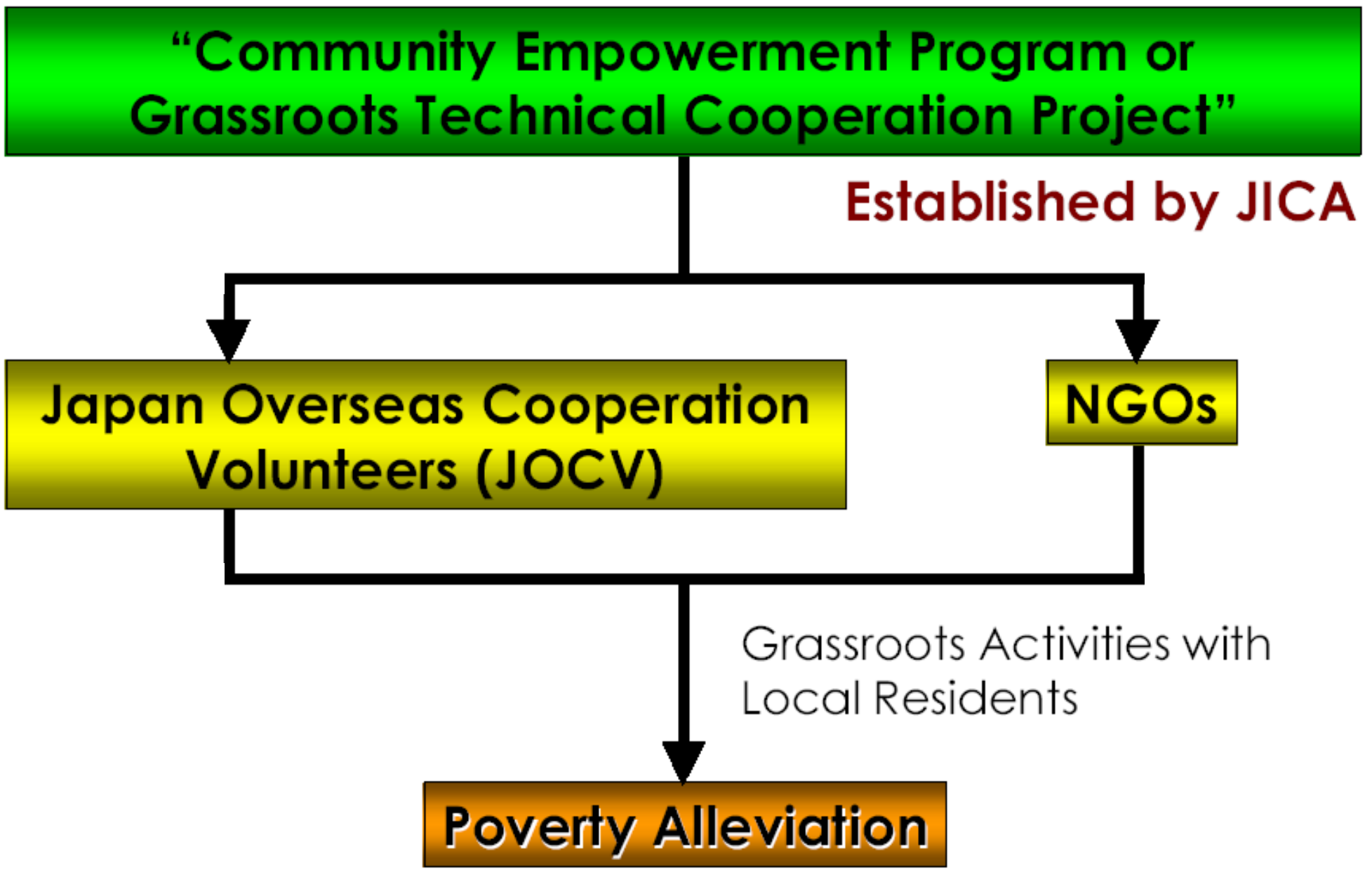
Poverty Dwelling on Riverbank

JAPAN INTERNATIONAL COOPERATION AGENCY

POVERTY ALLEVIATION BY JICA

Since the beginning of the 1990's, JICA has been conducting activities to support poverty reduction.

To promote its anti-poverty measures directly, JICA established the "Community Empowerment Program or Grassroots Technical Cooperation Project" in FY 1997 to serve as the framework of cooperation on poverty reduction to benefit the local residents.



Poverty Alleviation by JICA

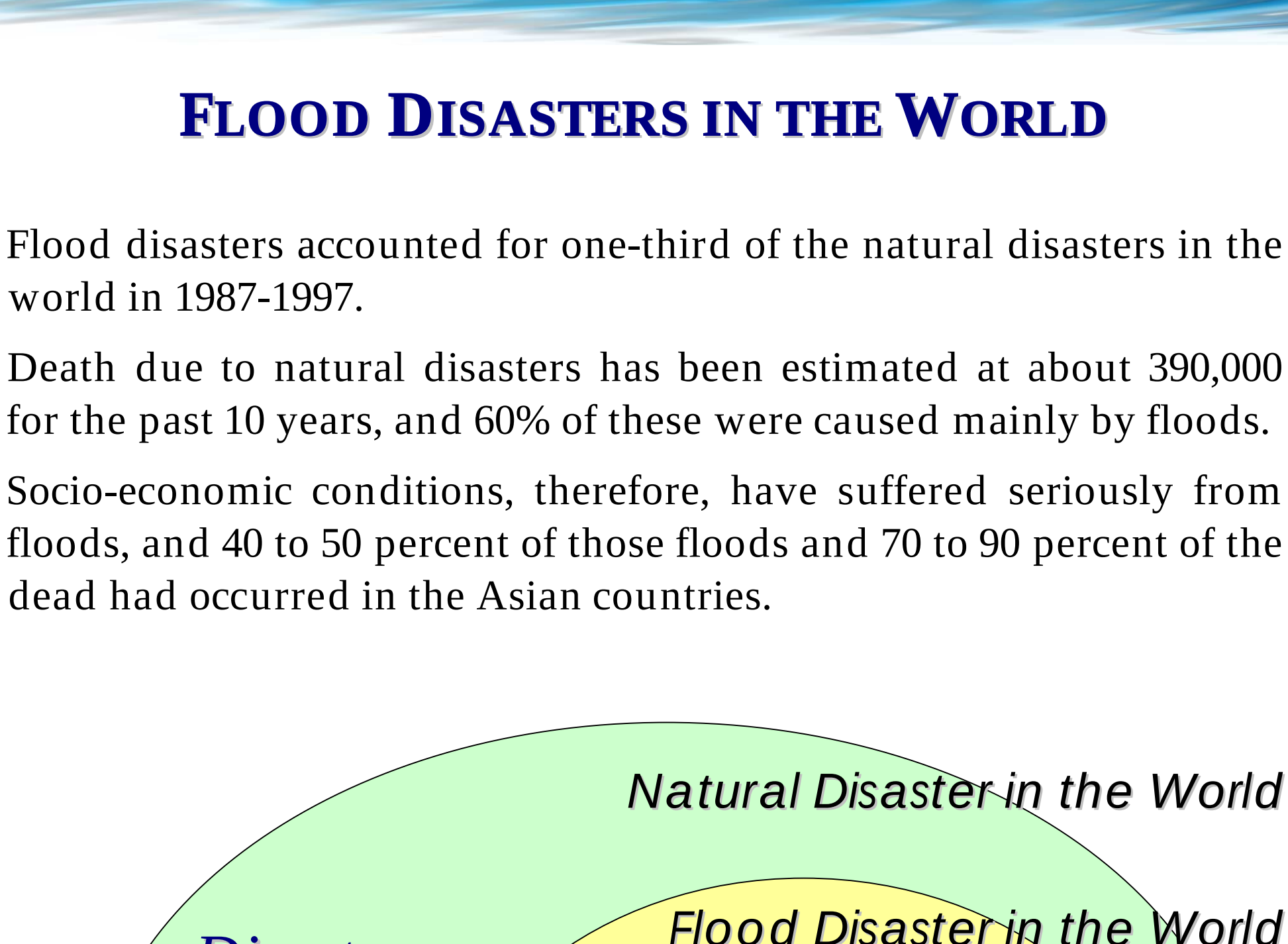
JAPAN INTERNATIONAL COOPERATION AGENCY

FLOOD DISASTERS IN THE WORLD

Flood disasters accounted for one-third of the natural disasters in the world in 1987-1997.

Death due to natural disasters has been estimated at about 390,000 for the past 10 years, and 60% of these were caused mainly by floods.

Socio-economic conditions, therefore, have suffered seriously from floods, and 40 to 50 percent of those floods and 70 to 90 percent of the dead had occurred in the Asian countries.



Flood Disasters in the World

JAPAN INTERNATIONAL COOPERATION AGENCY

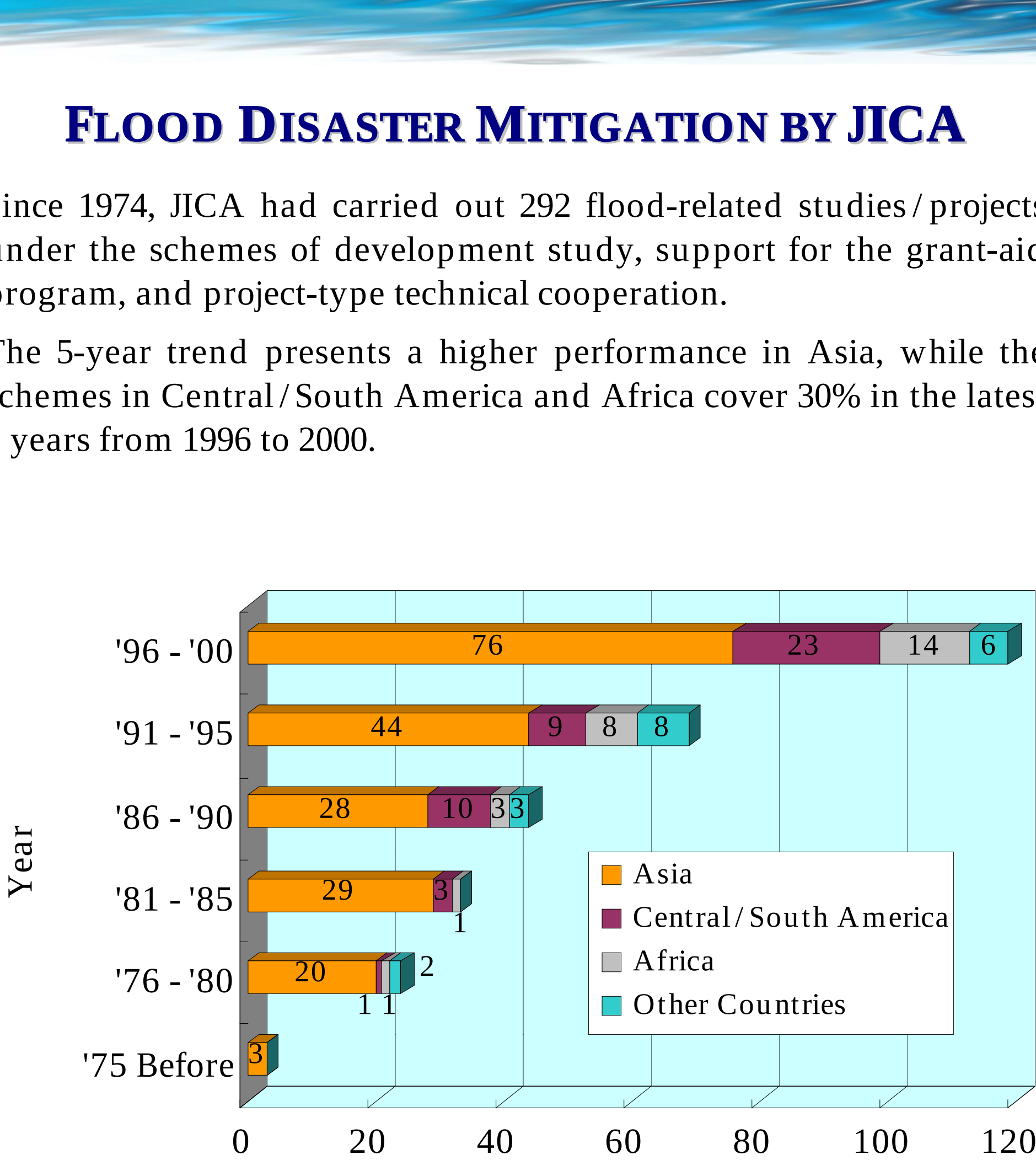
Flood Disasters in the World

JAPAN INTERNATIONAL COOPERATION AGENCY

FLOOD DISASTER MITIGATION BY JICA

Since 1974, JICA had carried out 292 flood-related studies/projects under the schemes of development study, support for the grant-aid program, and project-type technical cooperation.

The 5-year trend presents a higher performance in Asia, while the schemes in Central/South America and Africa cover 30% in the latest 5 years from 1996 to 2000.

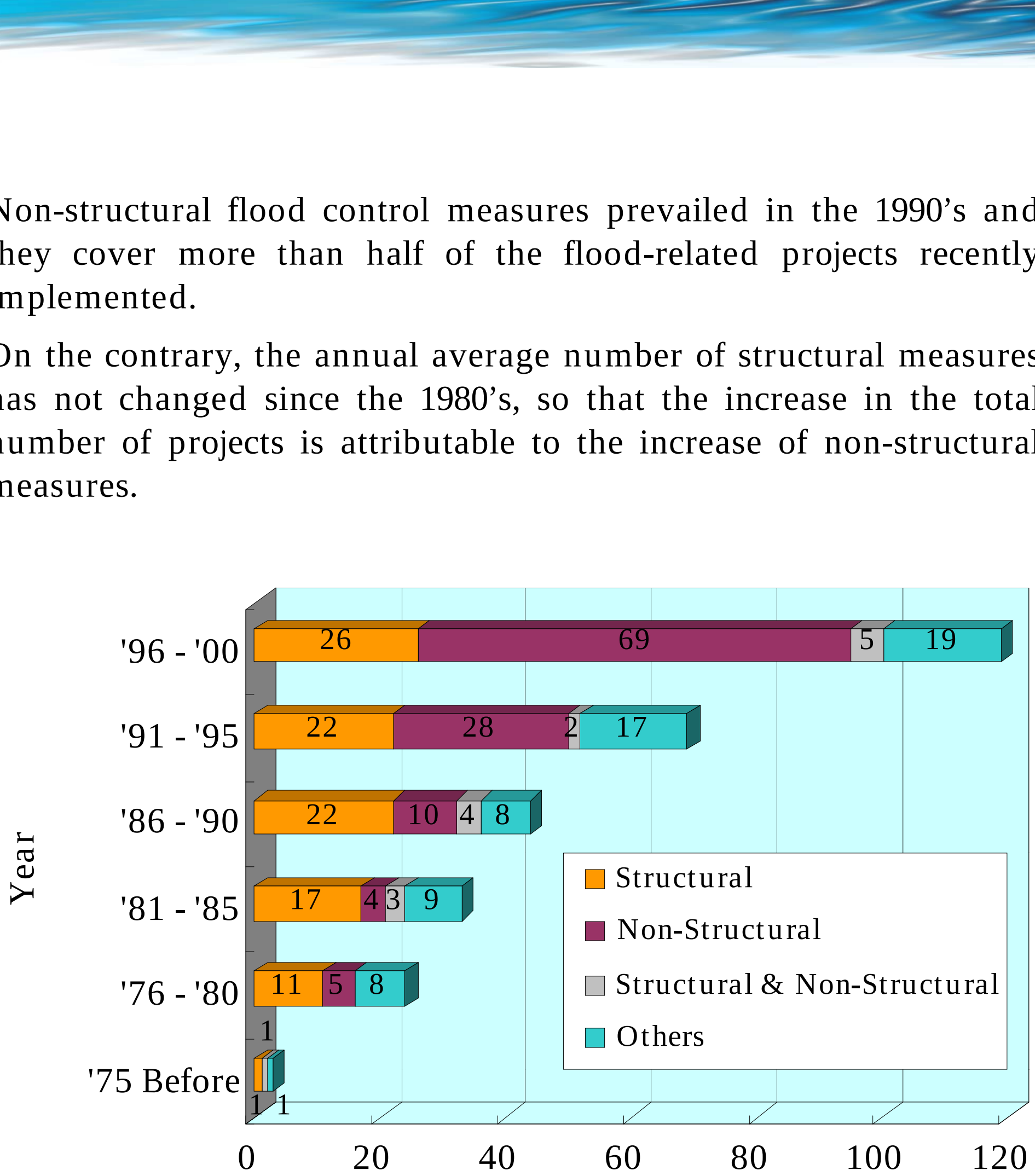


Flood Disaster Mitigation by JICA

JAPAN INTERNATIONAL COOPERATION AGENCY

Non-structural flood control measures prevailed in the 1990's and they cover more than half of the flood-related projects recently implemented.

On the contrary, the annual average number of structural measures has not changed since the 1980's, so that the increase in the total number of projects is attributable to the increase of non-structural measures.



Classification of Flood Control Mesure

Trend of Non-Structural Flood Control Measures

JAPAN INTERNATIONAL COOPERATION AGENCY

COMPREHENSIVE RIVER BASIN DEVELOPMENT WITH THE TECHNICAL ASSISTANCE OF JICA

The comprehensive river basin development project in Brantas, East Java, Indonesia, is a case of economic development.

The development projects consisted of river improvement works, irrigation systems, drainage systems and so on.

Brantas River Basin

JAPAN INTERNATIONAL COOPERATION AGENCY

The projects have produced benefits, such as the increase of safety level against floods to a 50-year return period, electricity production of about 1.0 billion kWh per year, irrigation of 340,000 hectares of land, raw water supply of around 300 million m^3 per year for drinking water and industries, tourism and so on.

Lodoyo Irrigation Canal

JAPAN INTERNATIONAL COOPERATION AGENCY

POST-DISASTER RESTORATION PROJECT WITH THE ASSISTANCE OF JICA

The flood control project in Ormoc City in the province of Leyte, Philippines, is a typical case of a post-disaster restoration project.

The project's objective was to develop the area by providing protection against floods larger than the one that took place in Ormoc in November 1991 accounting for 8,000 deaths and missing.

Flood Situation in Ormoc City

JAPAN INTERNATIONAL COOPERATION AGENCY

The residents of Ormoc are now relieved from the threat of flood disaster and this contributes to the development of the regional economy.

Post River Improvement in Ormoc City

JAPAN INTERNATIONAL COOPERATION AGENCY

FLOOD DISASTER MITIGATION FOCUSING ON POVERTY WITH THE TECHNICAL ASSISTANCE OF JICA

Flood is a recurring phenomenon in Bangladesh. People in that country practically live with floods. Since farmers have no other means of livelihood apart from farming, they are very vulnerable to flood damage.

JICA study team formulated an integrated rural development plan, targeting small-scale flood mitigation and poverty alleviation.

Flood Disaster Mitigation Focusing on Poverty in Bangladesh

JAPAN INTERNATIONAL COOPERATION AGENCY

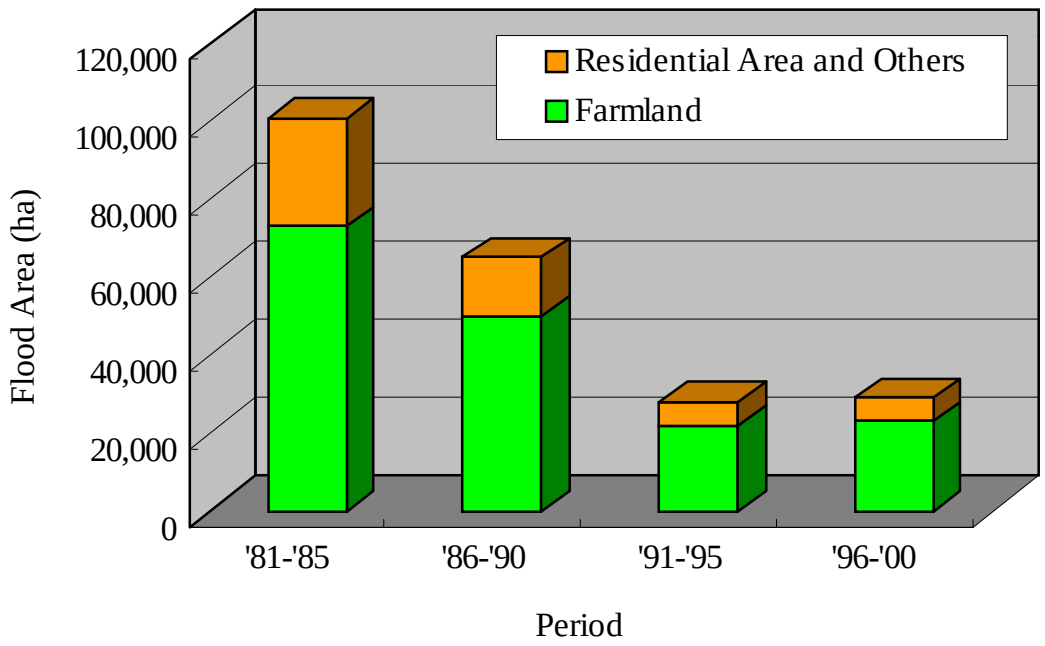
Furthermore, to ensure the sustainability of the proposed projects, participatory approach, self-managed savings and credit programs, cost-sharing and institutional building were proposed.

Participatory Approach in Rural Development Projects in Bangladesh

JAPAN INTERNATIONAL COOPERATION AGENCY

FLOOD CONTROL IN JAPAN

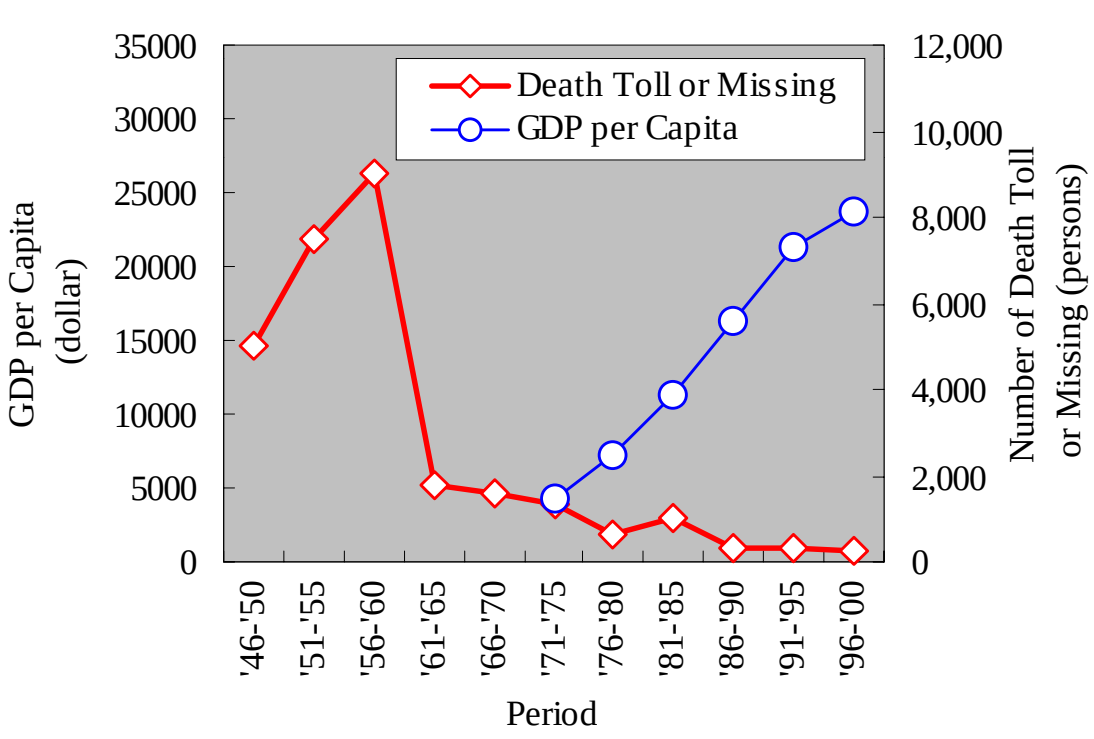
The flooded areas in Japan have been decreasing in every 5 years because flood control projects were implemented.



Trend of Flood Area in Japan

The figure bellow shows the 5-year trend of Number of Missing and Deaths and Gross Domestic Product (GDP) per Capita in US dollars.

The number of deaths or missing due to floods has been decreasing since 1960 because of the serious efforts on flood control. The flood control projects have contributed to the stability of livelihood and socio-economic development, which caused the increase of GDP per Capita from 1970.



Trend of Number of Deaths or Missing and GDP per Capita in Japan

JAPAN INTERNATIONAL COOPERATION AGENCY

WORKSHOP ON WATER AND POVERTY IN DHAKA

The Asia-Pacific Regional Consultation Workshop on Water and Poverty was held in Dhaka, Bangladesh, on September 22 - 26, 2002.

Workshop on Water and Poverty in Dhaka

Some of the recommendations concerning poverty alleviation are listed below;

(1) Demand-driven approach should be provided for the poverty alleviation programs, where the poor themselves set the agenda and define the priorities.

(2) Participatory approach is an agreed mechanism to make clear the needs, interests and priorities of the poor.

(3) Partnerships are a key element for all stakeholders to play a role in poverty alleviation effectively.

(4) Equity, with a gender focus, is the core of approach, both as an objective and as a key element of poverty alleviation.

(5) Well-planned investment is a core component of required pro-poor actions.

(6) Development of institutional capacities is indispensable for the different needs and options that could be identified and turned into practical steps for the sustainable poverty reduction.

(7) Transparency of information and shared understanding are essential for creating partnerships and harmonizing the potentials of different stakeholders to the common purpose of decreasing poverty.

JAPAN INTERNATIONAL COOPERATION AGENCY

WORKSHOP ON POVERTY AND FLOOD IN MANILA

The Regional Consultation Workshop on Poverty and Floods was held in Manila, Philippines, on October 17 - 19, 2002.

Workshop on Poverty and Flood in Manila

It was learned from the workshop that:

(1) There is a tendency both in governments and donors that the approach of flood mitigation and management projects is shifting from the traditional one, which primarily aims at economic development of the target area, to a new one in which the project includes components in favor of or directly targeting the poor.

(2) In spite of the success of flood mitigation and management projects in mitigating flood disasters and in achieving economic development of target areas, poverty incidence has not always been reduced. This indicates that a flood mitigation and management project is a necessary condition but not a sufficient condition for poverty alleviation that is exacerbated by the continuous inflow of poor people into the target areas.

JAPAN INTERNATIONAL COOPERATION AGENCY

CONCLUSION

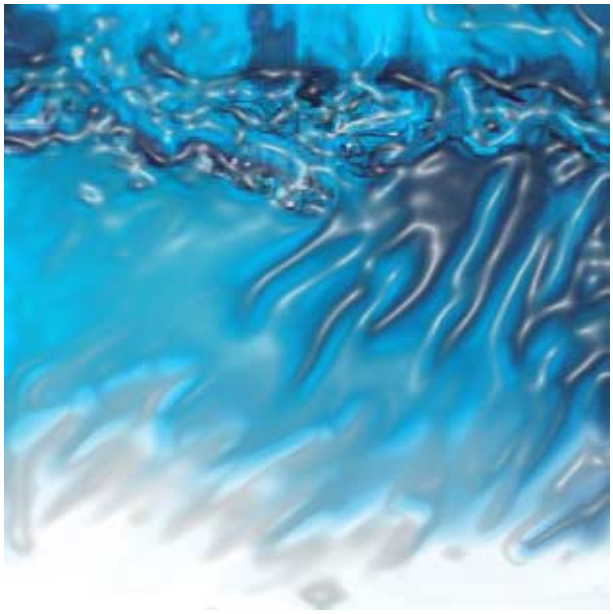
The activities of JICA on flood disaster mitigation have been expanding from engineering measures, such as river improvement, to non-engineering measures, such as pro-poor development assistance.

Considering the significance and magnitude of poverty issues in developing countries, coordinated activities among multilateral and bilateral agencies, private sectors, government agencies concerned, NGOs and local communities are needed.

In this regard, JICA will further cooperate with these entities to assist developing countries in promoting their economic development, improving the living environment, and reducing poverty.

JAPAN INTERNATIONAL COOPERATION AGENCY

2.　セッション「水道に関する海外技術協力の課題と今後の展望」



第２次水資源プロジェクト研究計画調査

第３回世界水フォーラム「水道にする関する海外技術協力の課題と今後の展望」

発表資料：国際協力事業団専門員　山本敬子

ＪＩＣＡの援助実績と成功例から学ぶこと

上水道分野の日本の援助はJICAの前身であるOTCA時代の1960年代の後半に短期調査や技術指導のために専門家を東南アジアへ派遣したのが始まりである。また、1968年からは集団研修「上水道施設」で研修員を受け入れている。

1974年のJICA設立後、専門家派遣はインドネシア、フィリピン、マレーシア等のアジアばかりでなくアフリカのケニア、中近東のイエメン、シリア、南米のボリヴィアと派遣国を広げ、専門家の幅広い活躍は水道分野の国際協力の基礎となってきた。浄水場や配水管網など水道施設整備の援助は、71年のジャカルタから始まり、コロンボ、マニラ等アジアの首都、タンザニアのダルエスサラーム、エジプトのカイロ、中米のグアテマラやドミニカの地方都市など世界各国で実施され、ハードつまり施設整備は日本の援助の手法として定着し,多くの途上国の水道普及に貢献してきた。

しかし一方で蛇口の水質が改善されない、無収水率が高い、施設が短期間で故障するなどと言った維持管理能力に関する問題が浮上してきた。

その解決のためには水道施設整備と同時に技術者の裾野を広げる人材育成が必要と判断され、JICAは技術者訓練のための技術移転プロジェクトを実施した。最初にタイ水道技術訓練センタープロジェクトがフェーズ１として1985年から1991年まで、フェーズ２として1994年から1999年まで実施され、タイの多くの技術者が研修を受けて能力を向上させた。その後同様のプロジェクトはインドネシアで1991年から６年間、エジプトで1997年から５年間、ヴェトナムで2000年から３年間実施されている。

地下水開発を中心とした農村給水プロジェクトは1970年代の後半から始まっており、1993年のTICADⅠ、1998年のTICADⅡと東京アフリカ開発会議が日本の主催で開かれ、アフリカ各地でのプロジェクト実施が大幅に拡大された。最近ではジェンダー配慮、少数民族を考慮した住民参加型アプローチがラオス、ザンビア等で採用され効果を上げている。

日本の水道分野の途上国援助は既に30数年に及び、援助国もその間約100カ国となり、世界の水道整備に大きな貢献をしてきた。しかしながら援助施設の少なからず部分がその効果を十分に発揮していないという指摘も多い。水資源をめぐる情勢は21世紀に入りますます厳しくなり、日本のODAも年々予算を減らされる中、効率的・効果的支援の重要性が増している。

そのためには明確な戦略を持って途上国援助に臨む必要がある。成功例を分析し今後の援助に応用することが重要と思われる。水道分野プロジェクトの成功例は数多くあるが、ここではプノンペン市水道整備プロジェクトの例を分析し、より効果的な援助を実施するための条件を明らかにした。

１．ドナー間連携：

プノンペン市水道整備プロジェクトは1991年のパリ和平合意後の1993年JICAによるマスタープラン策定支援が実施され、復興のためにまず何をしなければならないかを明確にした。そのマスタープランに沿って日本の無償をはじめUNDP、WB、ADB、フランスが施設援助、組織強化援助を実施した。例えば浄水場整備はフランスと日本、配管網整備は日本、フランス、ADB、WBが地域を分けて実施した。特筆すべき事は日本が水道メーターを無償で供与し、水量管理と料金回収システムに貢献したことである。

２．ハードとソフトの連携：

ハードつまり施設の整備と同時に経営面（ソフト）での強化がWBの支援で開始した。料金体系と集金体制の整備である。その結果プロジェクト着手後非常に早い段階の1996年には独立採算制の組織に移行し健全経営の基礎を固めている。

３．専門家・協力隊派遣による維持管理強化：

施設が完成し始めると同時に維持管理のための技術支援がスタートした。浄水場処理、配水施設の維持管理、浄水場の電気・機械設備の維持管理、水質（生物）分析など技術力強化のために専門家がそれぞれ派遣された。また水質分析を助けるために協力隊が派遣された。

４．南南協力の実施による人材育成：

タイ水道技術訓練センター（NWTTI）のカウンターパート、インドネシア水道・環境衛生訓練センターのカウンターパートがJICAの第三国専門家派遣事業によって水処理技術や水質分析技術の移転のためにプノンペン市水道に派遣された。また、NWTTIが主催する第三国研修コースでプノンペン市職員が研修を受けた。

５．国民参加型アプローチ：

北九州市水道局は専門家派遣に留まらず、小規模パートナー事業として施設更新で余った機材をプノンペン市に供与し、配水管網維持管理強化のための技術移転を実施し、地方自治体と途上国の直接的な協力関係を構築した。

６．オーナーシップによるプロジェクト推進：

一番の成功要因はプノンペン市水道公社に強いオーナーシップが存在したことである。局長のエクソンチャン氏はメーターの設置率を上げ、健全経営を目指すと共に優秀な人材を集めるために給料を上げた。また様々な機会を利用して職員を研修させ能力アップをはかった。プロジェクトの実施に当たってはドナー調整を主体的に実施し、多くのプロジェクト資金と技術力を集めた。

以上の条件がうまくかみ合ってプロジェクトの成功につながったと言える。

プノンペン市水道は成功しているがカンボディアの他地域では水道整備は非常に遅れている。他の国を見ても民族紛争が解決し復興を待っているスリランカ北東部、バングラデッシュのヒ素汚染やタンザニアのフッ素汚染問題、中南米諸国の高い漏水率、人口の肥大化で周辺貧困地域への水道整備がますます遅れていく大都市など、援助の必要な多くの国、都市、地方へプノンペン市のような成功例をどのように応用していくかが今後のJICA援助の課題であると考える。

KINGDOM OF CAMBODIA

PHNOM PENH WATER SUPPLY AUTHORITY

PPWSA

FROM 1993 UNTIL NOW

CASE STUDY

July 2002

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1 INTRODUCTION

PPWSA resumed operation after the Khmer Rouge Regime in 1979. In 1986, PPWSA became an autonomous body. However, this does not change anything in PPWSA until 1993. After the Paris Peace Agreement, the Government of Cambodia, with the assistance of different donors, started the change in PPWSA to be a fully autonomous body. Today, PPWSA is a fully independent, commercial oriented, self-surviving body.

2 PPWSA IN 1993

2.1 Organization

In 1993, PPWSA was still operating under heavy subsidy of the Cambodian Government. The total annual income generated then was only 0.7 billion Riels against to operating cost of 1.4 billion Riels.

There was more than 500 staff working in PPWSA with the average monthly salary of the staff was 50,000 Riels (approx 20 USD). Basically, the staff is under-qualified, under paid and have low motivation and work with low efficiency.

Nepotism was widely practice and the morale and discipline among the workers were low. The higher management was working for self interest rather than the interest of PPWSA. They were abusing the property of PPWSA for their own interest.

2.2 Existing Water Supply System

PPWSA was supplying to the city 63000m3 of water a day. The distribution network consisted of about 280 km of pipes ranging from 60mm diameter to 800mm diameter. This distribution network covered 40% of the city area and serving only 20% of the total city population.

30% of the pipes in the network had been laid for more then 100 years with the newest of the pipes more than 40 years. The determination of pipes and lack of maintenance gave rise to high physical loss in the system.

The number of connections was 26,881, out of which, only 13% connections were with water meters. This give rise to inaccurate and improper billing and actual volume of water sold was only 28% of production, out of which, the collection ratio was only 50%.

In 1993 alone, the number of illegal connection discovered was about 300. Staff of PPWSA did most of these illegal connections for their own benefits. Formal application for water connections were difficult and most of the time, impossible. The, going market price for illegal connection was around 1,000 USD per connection.

With all the above, it was no surprise that the NRW in 1993 was more than 70%. The water tariff then was also less than desired. The water rates for household and commercial were 300 riels/m3 and 550 riels/m3 respectively. With these rates, PPWSA was supply water below its operating cost.

3 REMEDIAL ACTIONS AND RESULTS

3.1 Changing of Culture

To counter all the negative elements and inefficiencies, PPWSA began the **Changing of Culture** based on Educating, Motivating and Disciplining among its staff and the public.

The first step taken was within PPWSA, the restructuring of the whole organization. Higher managements were given more direct responsibility. More dynamic younger generations with better qualifications were promoted to higher level with more responsibilities. Inefficient 'old timers' in high position kept their position but moved into more dormant roles.

This younger generation of managers was given much training in the various skills required to run PPWSA effectively. Incentives such as higher salary (10 times more than before) and bonuses for good performance were introduced together with penalty for bad intentions. Managers were also taught to be responsible and the spirit of teamwork is stressed.

The work responsibility of the staff was more streamlined and the number was reduced to less than 400.

The second priority was to ensure a higher generation of revenue. To achieve this, PPWSA took a 5-pronged approach. Firstly, PPWSA started to install water meters for all its connections. In 1996, 85% of 32,404 connections were with water meter. Today, all the 82,000 connections are with water meters. With the improvement in the water quality, PPWSA even introduced the more accurate Class C meters to replace the less accurate Class B meters.

Secondly, PPWSA set up an inspection team to stop the illegal connections. The public was advised to stop the activity of illegal connections. Incentives were given to anyone who can provide information on illegal connections. Heavy penalty was slapped on those found to be with illegal connections. Any staff of PPWSA found to be associated with the activity of illegal connections was removed immediately. As a result, the number of illegal connections dropped from 1 in a day to less than 5 in a year, if any.

Thirdly, PPWSA revised and improved its consumer files. A consumer survey was carried out to identify the actual number of connections. It was found in 1993 that there was 12,980 documented connections were not receiving water from PPWSA while 13,901 others were receiving water but were not documented. The consumer files were corrected and updated. In 1995, PPWSA started to implement an automatic billing system granted by the Government of France. This computerized system was completed in 1996 and helped tremendously in the bill collections.

Fourthly, PPWSA embarked on a program to educate the public, especially the high ranking families, other government agencies and even the top management of PPWSA on the importance of paying their water bills. This was not an easy task. However, a lot of hard work, with the strong support of the Prime Minister and the concept of "leadership by example", PPWSA managed to convince many VIPs and high-ranking officials to pay their bills. As a result, the bill collections from the public improved to 99% from just 50% in 1993.

Fifthly, probably the most difficult task of all, PPWSA had to increase the water tariff to cover its cost. To avoid having a huge jump in the water tariff, PPWSA proposed to have a 3-step increase in the water tariff over a period of 7 years. With the strong support of the banks and the commitment from the Government of Cambodia, particularly the Governor of Phnom Penh City and the Prime Minister, the first step increase was achieved in 1997 and the second step in 2001. However, PPWSA did not push for the third step anymore as its revenue is already fully recover the cost due to the higher collection ratio and the drop in UFW from 72% in 1993 to 22% as of today.

PPWSA also embarked on the program to rehabilitate its whole distribution network. A repair team was organized to standby 24 hours to make proper repair and maintenance of the distribution network. The public was encouraged to call to inform PPWSA on the leakages within the system.

In 1996, with the finance provided by the ADB, WB, Governments of France and Japan, PPWSA started to renew and rehabilitate its distribution network. By 2002, PPWSA managed to fully rehabilitate its distribution network. Treatment plants were also rehabilitated and constructed. Recently, with finance from ADB, a new 16km transmission line was installed across the city of Phnom Penh. New distribution network of 600 km were laid covering 100% of the inner city of Phnom Penh and expanding to suburban areas. This cover approximately 70% of the whole Phnom Penh City and PPWSA is embarking on a program to cover 95% by the year 2005.

With the laying of new pipes, the pressure within the distribution network was increased to 2.5bar from just 0.3 bars in 1993.

3.2 Social responsibilities

Through the years, PPWSA was also actively assisting the Government of Cambodia in its policy to alleviate poverty. Poor communities in Phnom Penh are mostly located at places with difficult access and poor hygiene. Most of them spend too much time and resources just to have sufficient water for their daily consumption. To lessen the poor families of the burden of buying water at high rate from water resellers, PPWSA made it a policy to supply clean and safe water directly these poor families. By the year 2002, PPWSA has made a total of 3046 connections among the 31 poor communities within the City of Phnom Penh. This figure reflects an almost 100% supply to all the poor families living along the coverage area in Phnom Penh.

4 CONCLUSION

There are many factors contributing to the improvement in the operations of PPWSA. Political stability, strong government support, external assistance from different donors i.e. ADB, WB, the Government of France and the Government of Japan have contributed much to the expansion of PPWSA.

However, the most important factor comes from within PPWSA. Today, PPWSA takes pride in its team of people who are hard working, responsible and self-motivated. This team of people has indeed worked hard with a common goal to overcome the difficulties in the past and shall be ready to face the challenges of tomorrow.

I think the lessons we learn are:

1-The access to water does not need to be free. The urban poor will be considerably better off paying for safe, piped water than they would be buying water of questionable quality from private vendors with 5 to 10 time higher price. Thus require willingness of the Government.

2-Tariff must reflect cost. Without financially viable, the services could not be sustainable and expanded. Peoples out side of coverage area will never receive water and people inside coverage area will suffer on water shortage.

3-The water company need to operate independently rather than being government run organizations. Autonomous give the flexibility on management, responsibility, efficiency and motivation of staffs.

4-The consumers are willing to pay is a very important factor. Keep advise, inform and good relation with the customers are the keys of success on collection and against illegal connections. Example from the top was the case of Cambodia.

5-External assistance is absolutely necessary for first investment. The self-motivation, efficiency, transparency and responsibility are the factors to get confidence from donors.

Appendix 1

	1993	Present
1. Human Resource		
• Staff/1000 Connection	20	5.3
• Staffing:	More than 500	391
*By qualification		
-Doctor Degree	0	1
-Master	0	11
-Engineer	16	27
-Technician& skill worker	19	116
-Accountants superior	3	7
-Accountants medium	4	10
2. Production Capacity m3/d	63,000	120,000
3. Distributions	Very poor conditions	
• Leak/Km of pipe/year		• 0.3
• Leak/Connection/year		• 1.9
4. UFW	72%	22%
5. Commercial		
*Customer	*26,881	* 82,000
• Domestic	• 78.10%	• 85%
• Commercial	• 21.10%	• 14%
• Administration	• 0.80%	• 1%
*Billing Ratio	• 28%	• 78%
*Collection Ratio	• 50%	• 99.64%
6. Financial Indicator	Not proper recorded	
• Account receivable		• 63 days
• Return on asset		• 5.26%
• Dept service ratio		• 1.69%
• Operation ratio		• 31%
• Self financial ratio		• 18.4%
• Total revenue	• 0.7 billion Riels	• 34 billion Riels
• Total operating expenses	• 1.4 billion Riels	• 9.4 billion Riels

Appendix 2

Background on the PPWSA Human Resource

From 1979 to 1996, Phnom Penh Water Supply Authority used to be a simple department of the Municipality of Phnom Penh. This means that PPWSA and its Director had very little power with regards to the management of the organization except on technical operations, while the Phnom Penh Municipality was the one making the important decisions in matters relating to clients and suppliers, personnel management, strategy development, etc. **Figure 2.1** illustrates the organizational structure in 1995; based on the PPWSA Director Order No. 54 dated 1 August 1995, which also defined the roles and tasks of the departments of the enterprise *(Internal sources, 1996)*

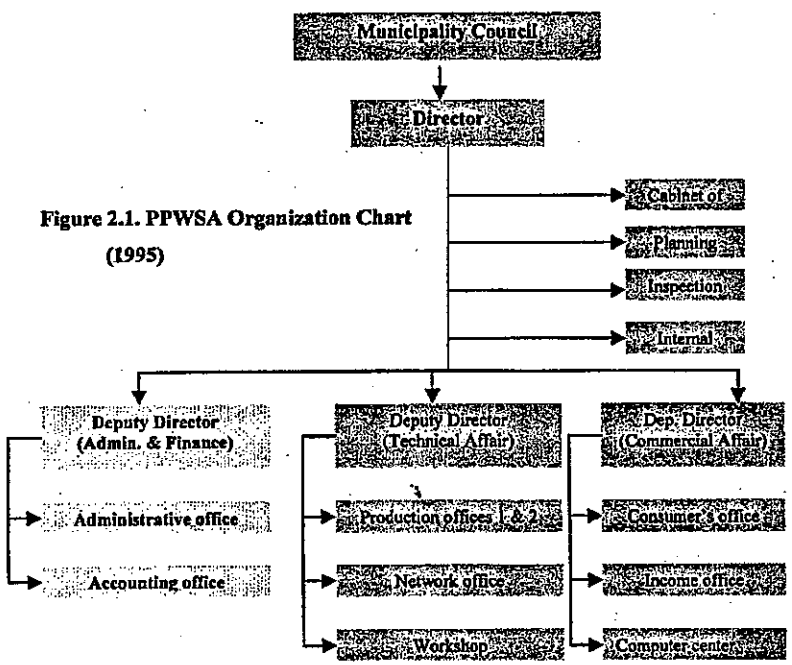


Figure 2.1. PPWSA Organization Chart (1995)

With the granting of the full autonomy status by the Royal Government of Cambodia to PPWSA in December 1996, the organizational structure also changed. Since then the organizational structure is as shown in **Figure 2.2** with five (5) departments namely, (1) Technical and Projects Department; (2) Commercial Department (Customer Service); (3) Financial and Accounting Department; (4) Distribution and Production Department, and (5) Administration and Human Resources Department. *(Internal sources, 2000)*

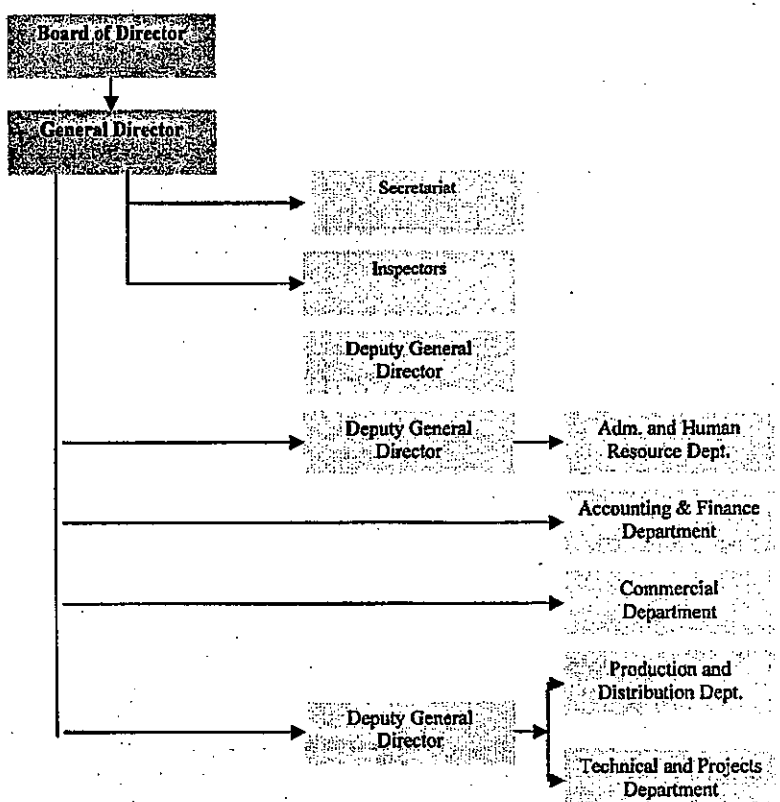


Figure 2.2: PPWSA Organization Chart - 1997

A Director who undertakes the tasks of planning, organizing, commanding, coordinating and controlling within his own department heads each department. Each department is again divided into sub-departments with specific functions.

World Water Council
3rd World Water Forum

P.P.W.S.A.

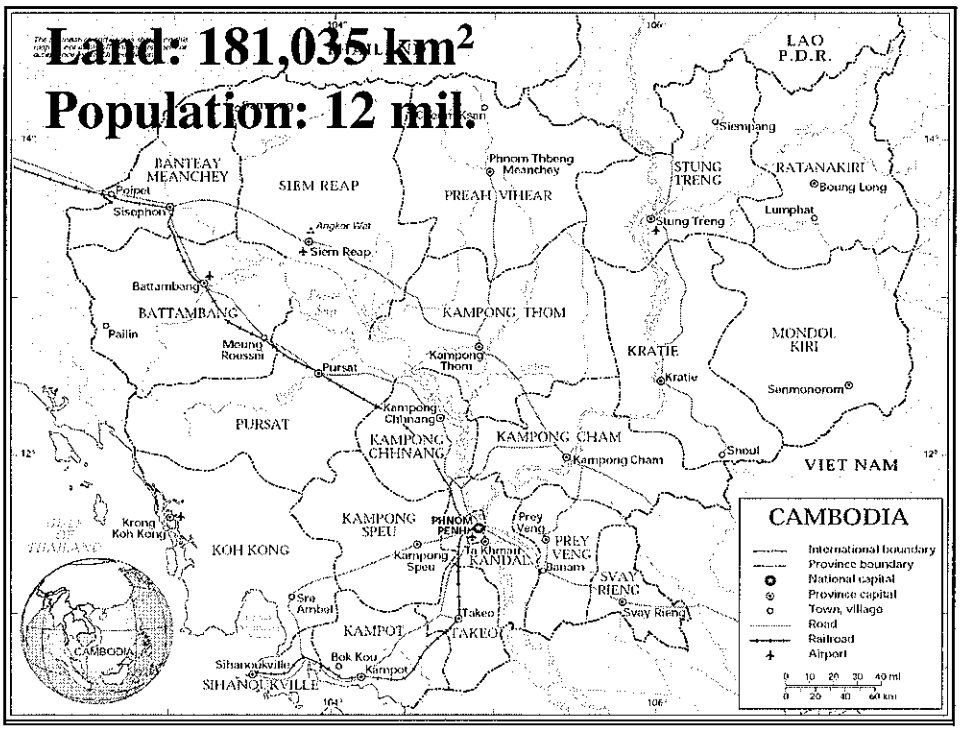
PHNOM PENH WATER SUPPLY AUTHORITY

Restoration Under Partnership

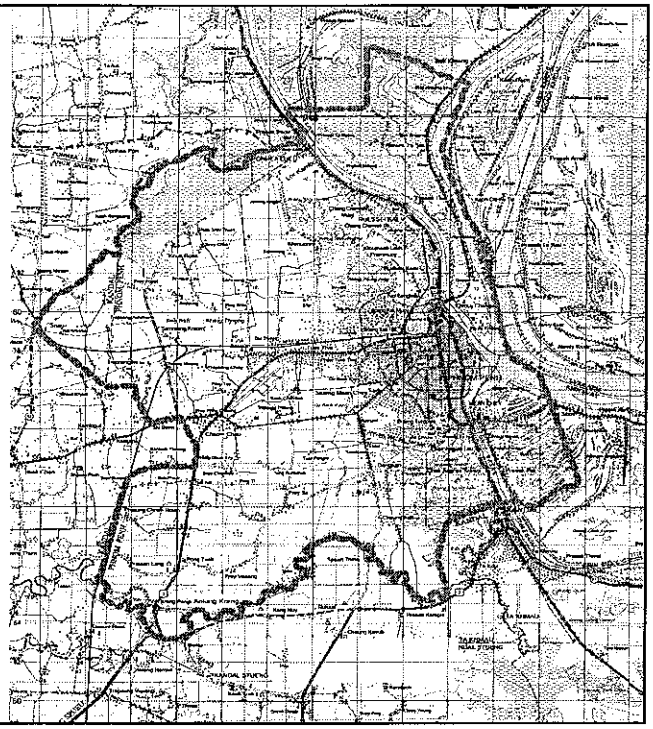
By
EK Sonn Chan
General Director

Land: 181,035 km^2

Population: 12 mil.



* Total area : 375 km²
* Population : 981 805
* Density : 2618 p/km²
  - 7 Khan
  - 76 Khum
  - 637 Phum
  - 4320 Krom



BACKGROUND

1895

- Creation of "Compagnie des Eaux et Electricité du Cambodge"
- 12,000m³/day & 40 km of Supply Network

1965 - 1975

- Total Supply Capacity: 155,000m³/day
- 280 km of Supply Network

1975-1979

- The Water Supply System was almost not operated resulting in high Degradation

1979-1997

- 1,945 of Public Underground Tanks
- Supply Pressure: 0.2 bar
- Lack of Technical Information & Manpower

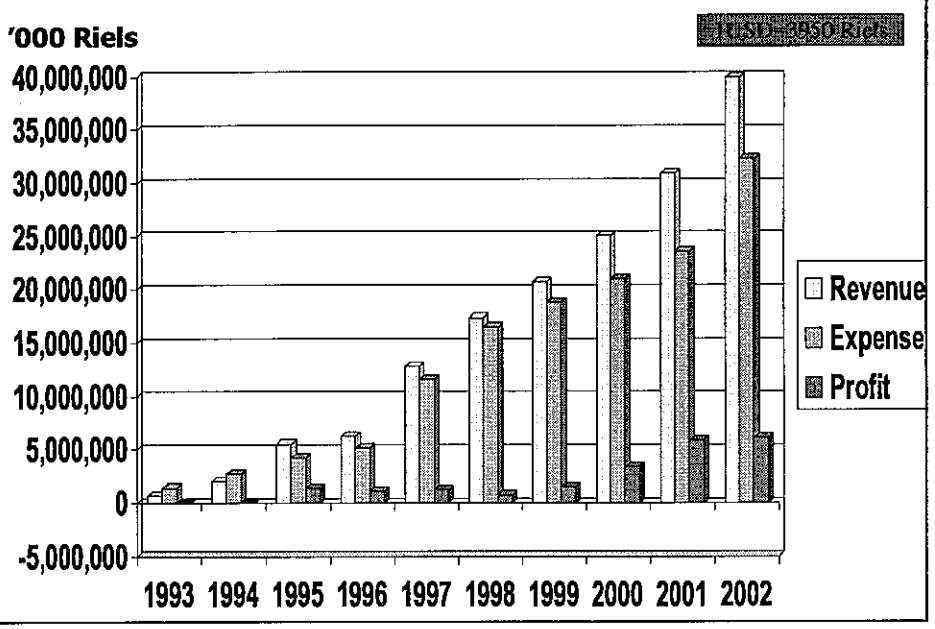
From 1997

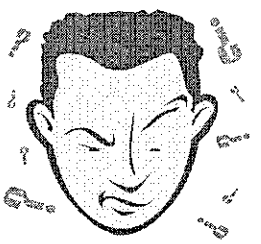
- Financial Autonomous

Then & Now

	1993	2002
Staff/1000 Connections	22	5
Capacity, m^3/day	65,000	185,000
Coverage	25%	80%
Supply Network	280km	752km
Supply Pressure	0.2 bar	2 bar
Supply Duration	10 hr/day	24 hr/day
Connections	26,881	85,700
Illegal Connections	>300/year	<5/year
Metered	12%	100%
Collection	50%	99%
NRW	72%	22%
Total Income	0.7 bill. R	34 bill. R
Operating Expenses	1.4 bill. R	9.4 bill. R
Total Expenses	N/A	27 bill. R

Financial Performance





HOW?

1-Spirit of Ownership

2-Partnership

1-Spirit of Ownership

A- Government Support

Support from the P.M.

- Appropriate Policies:
  * Full Cost Recovery
  * Financial Autonomous
- Support of Change
- Example From The P.M.
- Local Authorities Support:
  * Facilitate Physical Works
  * Public Education

B- The Change within P.P.W.S.A.

1-Turn around the process

- Restructuring (Streamlined Job Responsibility)
- Reshuffling Management Based on Quality
- Changing of Culture
- Decentralization of Decision Making
- Motivating & Disciplining


Regular

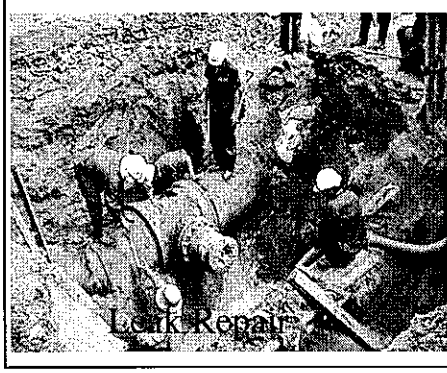
2- Training of Manpower

- Different Skills
- Local & Abroad
- Formal, On the Job, Study Tour

3-Improve Collection

- Update Customers File
- Incentive & Penalty to Collectors


Customer Survey


Leak Repair

- Reduce UFW

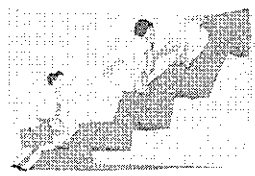
. 24hrs Leak Repairs
. Metered Connections
. Eliminate Illegal Connections:
  -Customer Educations
  -Incentive for Providing Info
  -Strictly Apply Heavy Penalties

4- Improve Services

- Address Customer Complaints
- Daily Control of Water Quality
- Maximize Supply Duration
- Maximize Supply Pressure

5-Financial Sustainability

- Revise Tariff
- Expand Customer Base
- Lower UFW
- Minimize Expenses



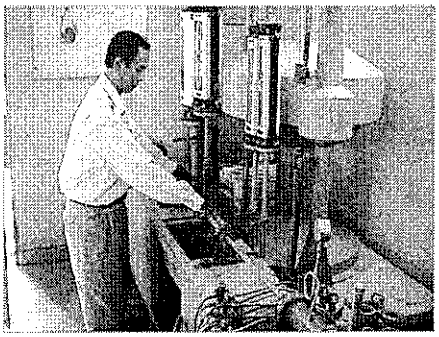
2- Partnership

Coordination Among Donors

- **UNDP**
- **Japan**
- **France**
- **World Bank**
- **Asian Development Bank**

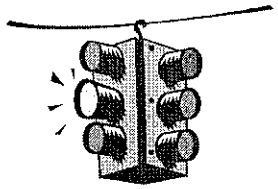
1- UNDP

UNDP/WB 2782 KH



- Institutional Capacity Building

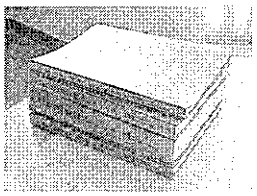
- Access to International Donor Communities



2- Japan

JAPAN

Master Plan (1993-2010)



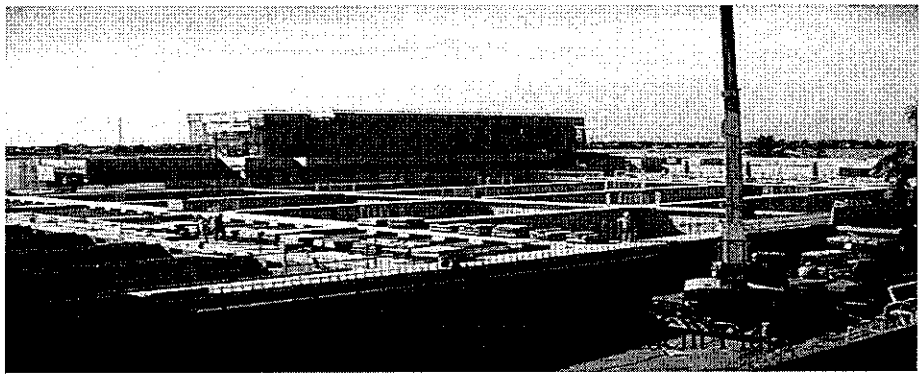
- URGENT REHABILITATION OF EXISTING FACILITIES
- EXPANSION WORKS
- DEVELOPMENT OF THE MANPOWERS
- STRENGTHENING OF FINANCIAL SITUATION

This Master Plan Was Using as The Frameworks for PPWSA Action and Coordination Among Donors

Japan (Continue)

Three Phases Project

- Urgent Rehabilitation of Water Supply Facilities Phase I
- Urgent Rehabilitation of Water Supply Facilities Phase II
- Expansion of Phum Prek Water Treatment Plant



Japan (Continue)

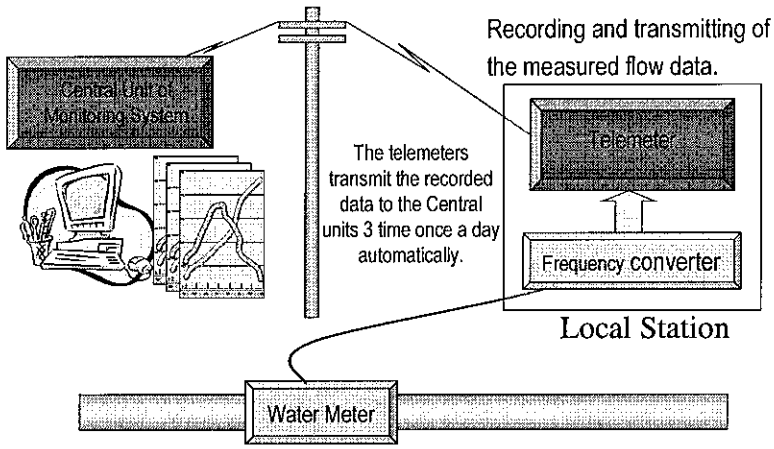
Technical Cooperation

- Providing Japanese Experts
- Providing Third Country Experts
- Providing Japanese Volunteers.
- Training of Manpower

Japan (Continue)

Cooperation at Local Level

Establishment of the data monitoring system on block distribution



3- France

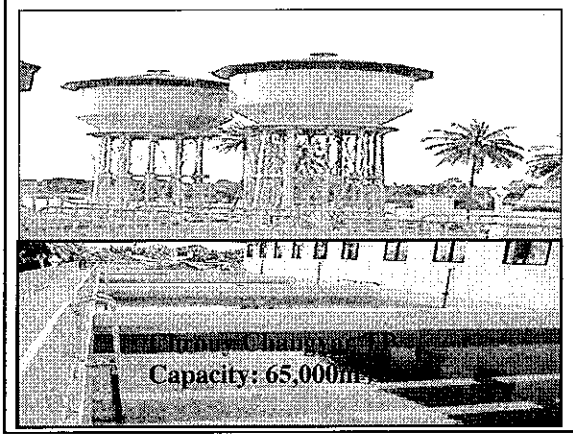
Three Phases Project.

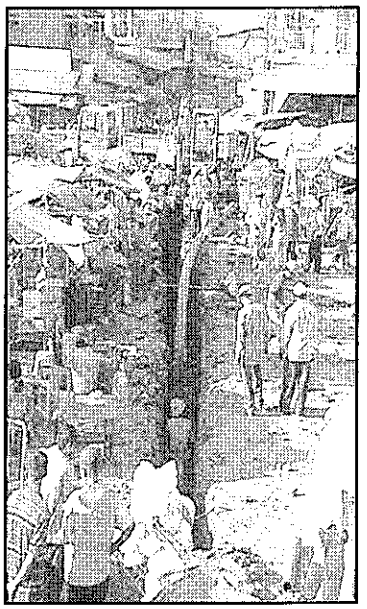
- Computerized Billing System
- Customers Management
- Rehabilitation & Expansion of Production.

4- Wold Bank

IDA Credit No. 3041 KH

- Institutional Capacity Building
- Rehabilitation of Supply Network
- Construction of New Treat. Plant



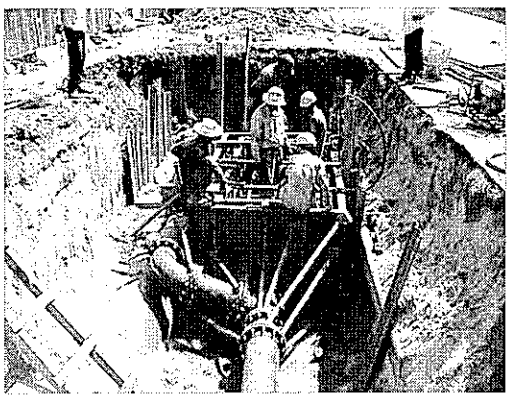


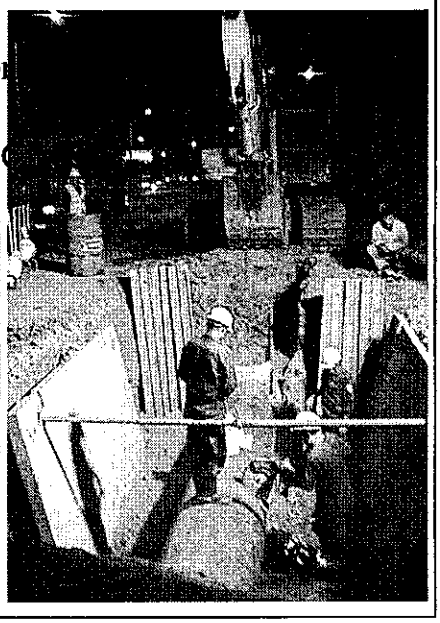
Pipe Installation

5- ADB

Project No. 1468 Cam (SF)

- Rehabilitation of Supply Netwo
- Construction of New Water Transmission Pipe Across PNH





Rehabilitation of Supply Network

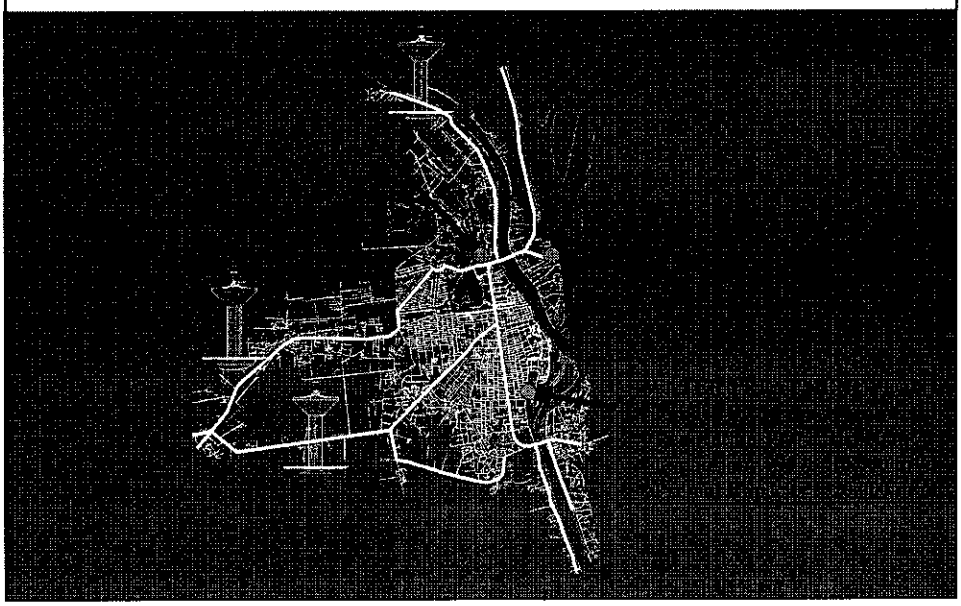
World Bank	
Year	1998-2001
Installation	PPWSA
Length of Pipe	111,763 m
Size of Pipe	100-500 mm

France and UNDP/WB	
Year	1993-1996
Installation	PPWSA
Length of Pipe	71,876 m
Size of Pipe	100-500 mm

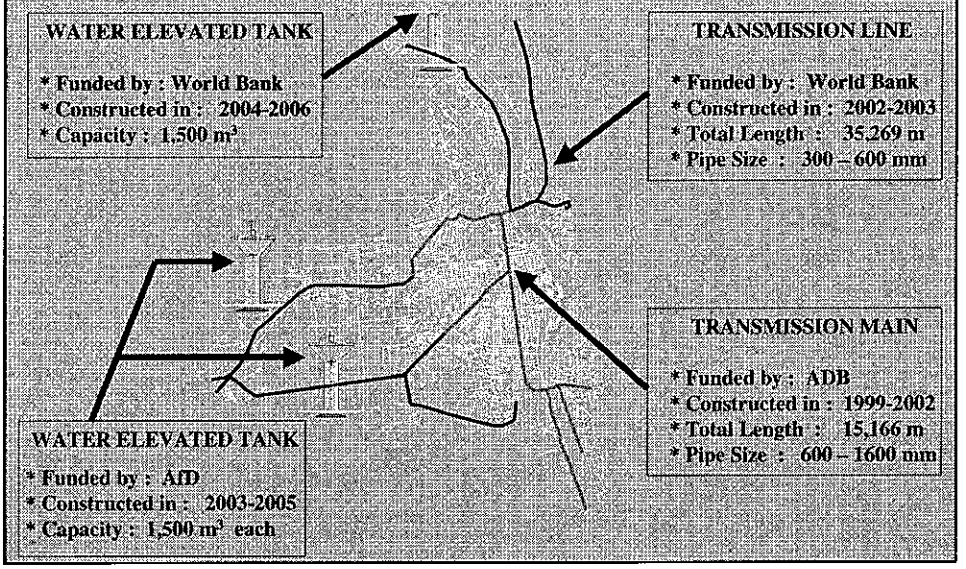
Asian Development Bank	
Year	1997-1999
Installation	PPWSA
Length of Pipe	86,280 m
Size of Pipe	50 - 300 mm

Japanese Project	
Year	1997-1999
Length of Pipe	87,987 m
Size of Pipe	50- 500 mm

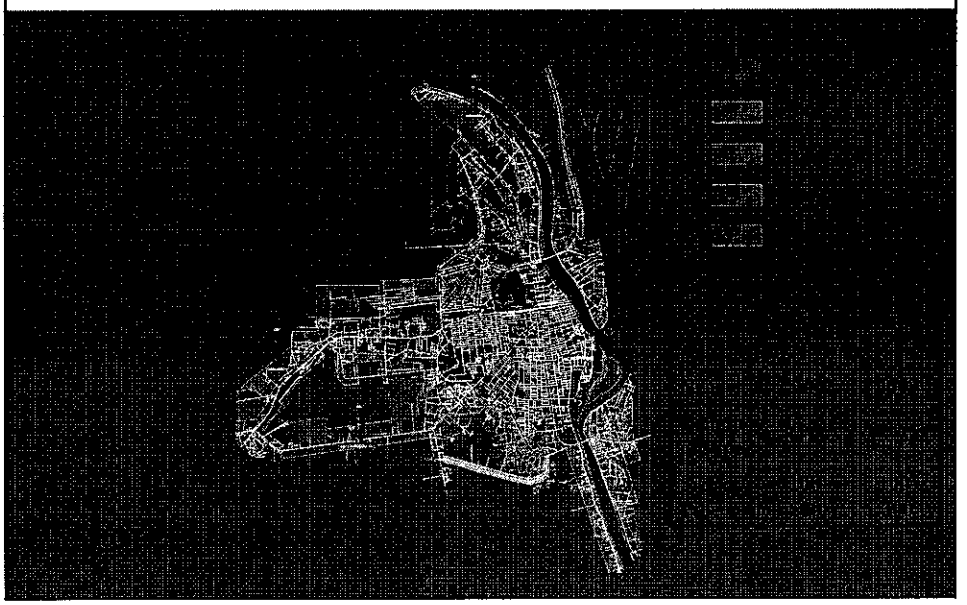
Expansion Of Supply Capacity



Expansion Of Coverage Area



In 2003 we cover over than 80%



REACHING OUT TO THE POOR

NOW

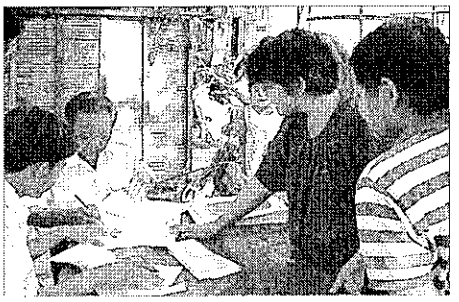
- 5,100 Families received water connections

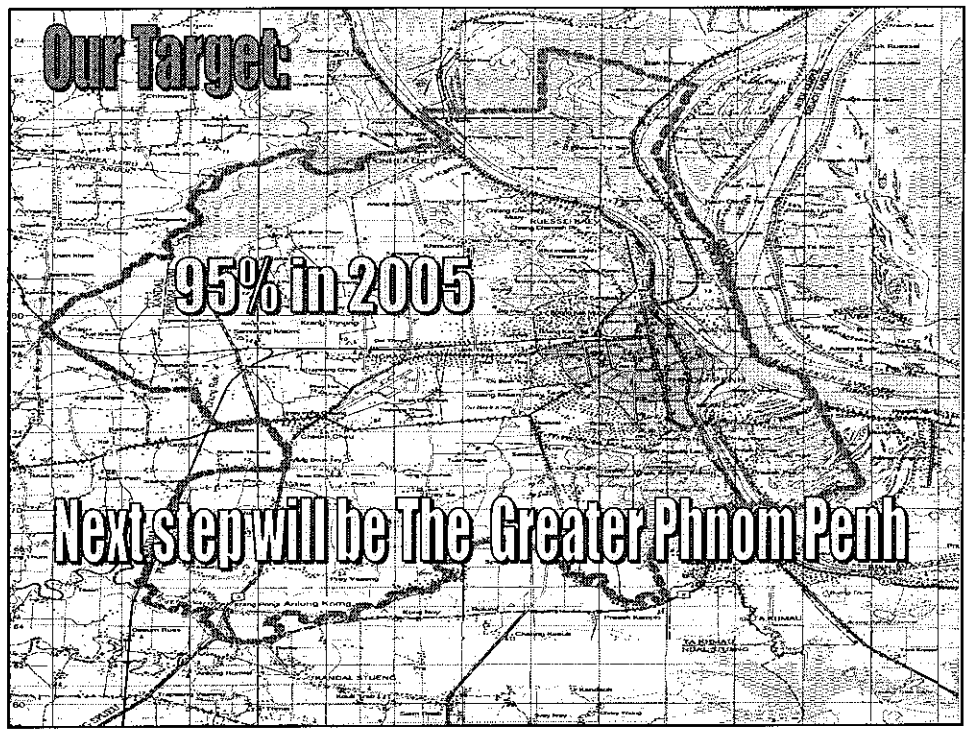
better than

BEFORE

- Alleviate Burden of Women & Children
- Savings ~ 300,000 Rs/Family/Year
- Health Condition Improved

WE TRY TO REACH OUT TO EVERYONE





Dear Donors,
we shall always remember
you as the one who makes the difference
in PPWSA,enabling us to promote better
life for the people in Phnom Penh,
like our proverb in Khmer says:

When we drink water,
we must remember the person
who dig the well.

Thank You

The Third World Water Forum
Water Supply, Sanitation, Hygiene and Water Pollution
The Trends and Prospect of International Cooperation in Technologies of Water Supply System

Third Country Expert Disptching Program: The Phnom Penh Experience

By Termsak Chotwanwirach

INTRODUCTION

As the success of the National Waterworks Technology Training Institute (NWTTI) Projects and the Third Country Water Supply Technology Training Courses, the Japanese Government, through the Japanese International Cooperation Agency (JICA) with the Royal Thai Government by the Department of Technical and Economic Cooperation (DTEC) had considered to dispatch an Thai expert from Metropolitan Waterworks Authority (MWA) for a Japanese technical cooperation project in the Kingdom of Cambodia by a Third Country Expert Program. This paper describes the experience of the author who had been dispatched to Phnom Penh Water Supply Authority (PPWSA) in the field of improving operation and maintenance of water treatment plant since November 1998 to April 1999.

BACKGROUND

The water supply system was first established in Phnom Penh, the capital city of the Kingdom of Cambodia, since 1895 by the Water and Electricity of Indochina Company from French at Chruoy Changwar WTP.However the plant was deteriorated and stopped operation since 1985 because of severe financial difficulties and loss of skilled staffs resulting from the long civil war disturbances.The public water supply system consists of two plants (1) Chamcar Morn WTP was operated in 1958 with present capacity of 20,000 CMD, diverted raw water from Bassac River and (2) Phum Prex WTP was operated in 1966 with present capacity 100,000 CMD, diverted raw water from Sap River.Since Phum Prex WTP was the main water production of PPWSA so the author decided to work at this plant.

PROCEDURES

The first necessary step before improving operation of water treatment plant was to evaluate the operation performance of existing unit processes. The investigation was approached in two steps (1) Evaluate the existing system by collecting, analyses and evaluate all available document concerning design, operation and water quality analysis data and (2) Checking of actual treatment process efficiency by field survey, field measurement and bench-scale experiments.

RESULTS

Summary of some selected items for this presentation are as follows:

1. Process unit's efficiency

The following process units were select to evaluate the treatment processes performance and unit process efficiency such as :

1.1 Flocculator

The vertical shaft paddle type flocculator was appropiate choice for the following reasons: minimal maintenance, operational flexibility, very little headloss across the basin, easy control of mixing intensity, effectiveness and minimal impact to the overall performance if one unit malfunctions.

1.2 Inlet channel of sedimentation basin

The inlet structure between the flocculator and sedimentation basin was called wooden split rolls, this was the most efficient and economical designs by placing the flocculation basin at the influent end of the sedimentation basin. This arrangement offers many advantages such as minimal land requirements, minimal floc breakage between the two processes, simplicity of design, simple and economical construction.

1.3 Sedimentation basin

The rectangular basin that was narrow, shallow and long with a horizontal flow was appropiate configuration due to its hydraulic stability, tolerance of shock loading (sudden changes in plant flowrate), minimal amount of short-circuiting flow, simple to operate. The measurement of sludge level in sedimentation basin for 53 operational days was found that 96.8 % of sludge deposited in the front half of the basin provided that flocculation process was function well.

1.4 Filter Performance

In order to optimize the filtration process, plant operators should routinely evaluate filter performance as follow : (1) evaluate filter maintenance conditions : depth of filter bed, sand loss, ups and down of sand layer (2) evaluate filter operation : filtered water turbidity and head loss, length of filter run, ratio of backwashed water to filter water amount (3) evaluate effectiveness of filter washing procedure : visual inspecting filter bed before and after filter washing, measuring turbidity of backwash waste water at one-minute intervals after initiating backwash, core sampling of filter bed befor and after filter washing.

2. Actual Sludge Situation

The sludge production rate, with a nominal input of 100,000 CMD, in the wet and dry season was 33 and 4 ton per day, whereas the annual average was 12 ton per day, respectively. The sludge withdrawal sequence was required periodical shutdown of a basin every two months in dry season and every 1-2 week in rainy season.

There was no sludge treatment and disposal system in PPWSA, therefore washing wastewater from filters backwashing and desludge water from sedimentation basin cleaning was generated and discharged directly to the Sap River downstream of the intake.

When the treatment capacity was expanded in the future and pollution loading becomes serious, necessary action must be taken to consider about the sludge treatment and disposal in order to keep the Sap River water in good quality especially in dry season.

3. Water Quality Management

The water quality control was conducted ranging from raw water source, water treatment processes and distribution network on daily, weekly and monthly basis. The contents were mostly about physical, chemical and bacteriological analysis but for biological analysis didn't start yet. So the biological analysis should be started for not only the maintenance of the raw water source quality but also for better operation and control of treatment process.

The results of tap water analysis in distribution network in 1998 were found that heterotrophic bacteria, total coliform bacteria and Escherichia coli were exceeded WHO Guidelines for Drinking Water. It was understand that tap water was polluted in the distribution system and free residual chlorine in tap water was not kept constant level all the time.

CONCLUSION

The utilization of the third country training system and the third country expert dispatching system enable efficient and effective transfer of appropriate technology and should be appropriate trends on future technical cooperation of water supply system for developing country.

第３回世界水フォーラム

「水道に関する海外技術協力と今後の展望」セッション

国際協力事業団　参考資料

上水道分野に対する海外技術協力

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

目　次

１．はじめに

第３回世界水フォーラムでは３３もの主要テーマのもとに３４７の分科会が開催され、分野や地域を越えた幅広い内容が議論されています。ＪＩＣＡはその中で開発協力に係わりの深いテーマについて積極的に参加しています。本日、上水道セクターに関する分科会「水道に関する海外技術協力と今後の展望」では、ＪＩＣＡがこれまで数多く実施してきた途上国に対する水道施設の整備や技術の向上などに対する支援の中から、カンボディア、タイ、スリランカ等の事例をご紹介します。

この資料は本分科会に参加された方に、ＪＩＣＡの活動をより詳しく知っていただくための参考として作成したものです。

－ 世界の現状 －

現在、世界人口の３分の１にあたる人々は水不足に直面しており、10 億人以上が安全な飲料水を利用できない状態にあるといわれています。他方で、開発途上国に生活する社会的弱者や貧困層の多くは、農村地域、都市周辺部や低湿地、あるいは乾燥地帯などの劣悪な環境下に居住しています。しかし、それにもかかわらず、こうした人たちへの配慮は軽視されがちなのではないでしょうか。

－ 安全な水の安定した供給 －

具体的には安全な水を安定して入手することができない地域の住民は、汚染された地下水や不衛生な表流水を利用せざるを得ない状況にあり、コレラや赤痢といった水系伝染病、アフリカ地域におけるギニアウォーム（寄生虫の一種）などに苦しんでいます。貧困地域における「安全な水」を確保し、それらを安定して供給することは地域の住民の生活に直結する重要な課題であり、早急な解決が求められています。

－ ＪＩＣＡの取り組み －

ＪＩＣＡは、これまでも、また、これからも、水資源の調査、開発計画や管理計画の策定、給水計画の策定、保健衛生教育の推進などを通して、社会的弱者や貧困層を重視した多様な技術協力を展開し、開発途上国の貧困削減に貢献していきます。

⇒国際協力事業団（ＪＩＣＡ）とは

国際協力事業団（ＪＩＣＡ）は、我が国が実施している政府開発援助（ＯＤＡ）の中で、開発途上国に対して技術協力を実施することを目的に１９７４年８月１日に設立されました。ＪＩＣＡが担当するのは、二国間援助のうち贈与（無償による援助）に当たる部分で、技術協力と無償資金協力の調査・実施促進業務等を担っています。

２．国際協力事業団（JICA）の上水道セクターの援助実績

これまで（ＪＩＣＡが設立された１９７４年から２０００年まで）ＪＩＣＡが展開してきた多様な技術協力について、実績を以下に紹介します。

2.1　技術協力プロジェクト（旧プロジェクト方式技術協力、開発調査プロジェクト）及び無償資金協力事業のプロジェクト数

①　水分野全体のプロジェクトと調査件数及び全体に占める割合

1974 年から 2000 年迄の水分野に係る技術協力プロジェクト及び無償資金協力事業の全プロジェクト/調査件数は合計 1347 件である。これは全プロジェクト/調査件数の３分の１強を占める。援助形態別に分類した表を次に示す。

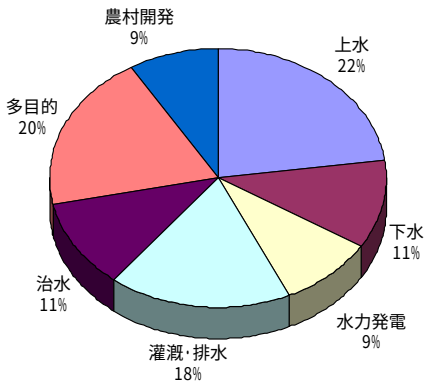
JICA水セクタープロジェクト並びに実施全プロジェクト/調査件数 (1974 – 2000)

援助形態	① 水分野ﾌﾟﾛｼﾞｪｸﾄ数	②全ﾌﾟﾛｼﾞｪｸﾄ数	①/② (%)
開発調査	843	1,829	46.1
無償資金協力	366	996	36.7
ﾌﾟﾛｼﾞｪｸﾄ方式技術協力	138	959	14.4
計	1,347	3,784	35.6

②　水分野全体の中の分類

①で示した水分野全体のプロジェクトをさらに小分類に分けた場合の数を以下に示す。上水道セクターは 20%強を占め、最大の割合を占める。

セクター別分類（件数による分類）



セクター別分類

セクター	合計（件数）
上水道	308
下水道	147
水力発電	125
灌漑・排水	236
治水	148
多目的	267
農村開発	116
合計	1,347

③上水道セクターのプロジェクト/調査件数及び水分野全体に占める割合

水分野全体の中で上水道セクターの占めるプロジェクト数と占める割合を協力形態別に次に示す。これを見ると無償資金協力が圧倒的に多い。

JICA上水道プロジェクト数 (1974 – 2000)

協力形態	上水道ﾌﾟﾛｼﾞｪｸﾄ数	水分野ﾌﾟﾛｼﾞｪｸﾄ数	全プロジェクト数
開発調査	100 (5.5%)	843 (46.1%)	1,829 (100%)
無償資金協力	202 (20.3%)	366 (36.7%)	996 (100%)
プロジェクト方式技術協力	6 (0.6%)	138 (14.4%)	959 (100%)
計	308 (8.1%)	1,347 (35.6%)	3,784 (100%)

%：各協力形態別に、全プロジェクトに対する割合。

④上水道セクターの地域別プロジェクト/調査件数

同様に上水道セクターのプロジェクト数を協力形態ごとに地域別に示す。これをみると地域的にはアジア、アフリカに集中しているが、これは無償資金協力が他地域に比べて圧倒的に多いことが原因と考えられる。

地域別スキーム別プロジェクト数　(1974 – 2000)

地域	開発調査	無償資金協力 基本設計調査	プロジェクト方式 技術協力	合計
アジア	44	48	2	94
アフリカ	27	88	3	118
欧州	1	1		2
大洋州	3	8		11
中近東	14	25	1	40
中南米	11	32		43
合計	100	202	6	308

2.2 専門家・青年海外協力隊派遣、研修員受入の人数

水分野および上水道セクターに係る専門家、青年海外協力隊の派遣数、および海外から日本に来て研修した人数は、分野別および地域別に次のようになる。

派遣・研修事業　（1990 - 2000）

スキーム	上水道セクター	水分野	全分野
専門家派遣数	286 (0.5%)	2,575 (4.9%)	52,565 (100%)
青年海外協力隊派遣数*	64 (0.2%)	229 (0.6%)	35,679 (100%)
研修員受入数	1,054 (0.7%)	6,096 (4.3%)	142,399 (100%)

*：　上下水道の総数。

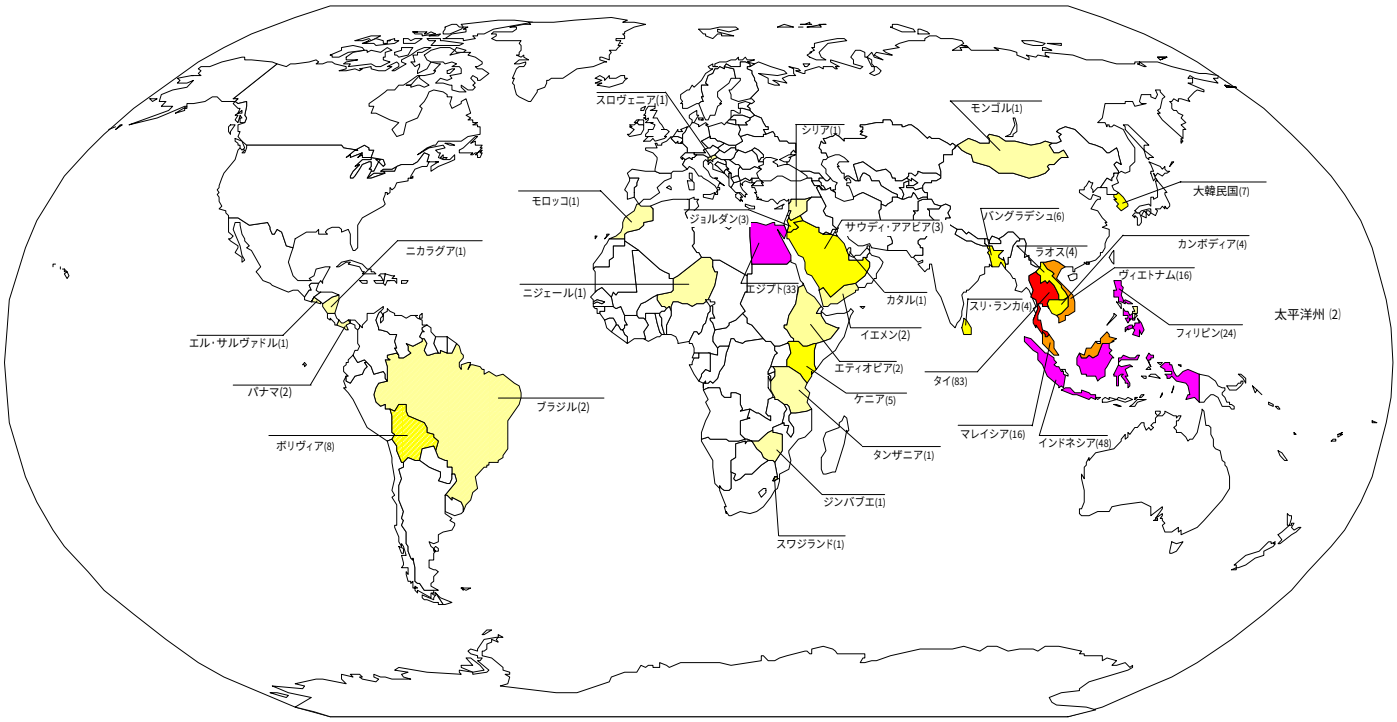
%：各スキーム別に全分野に対する割合

上水道セクターの地域別派遣・研修員受入数　(1990 – 2000)

	専門家派遣数	青年海外協力隊* 派遣数(1994-2001)	研修員受入数
アジア	213	9	598
アフリカ	12	18	114
欧州	1	0	21
大洋州	2	7	36
中近東	44	0	138
中南米	14	21	138
国際機関	0	0	9
合計	286 人	48 人	1054 人

*：1993 年以前は上下水道が区別されていないので、資料は 1994 年以降を対象とした。

開発途上国の人造りと技術移転の為に、派遣された日本人あるいは第三国の上水道専門家は 1990 年から 2000 年にかけて長期専門家、短期専門家の合計で 286 名に達する。派遣先を次図に示す。



上水道セクターに係る長期・短期専門家の派遣先

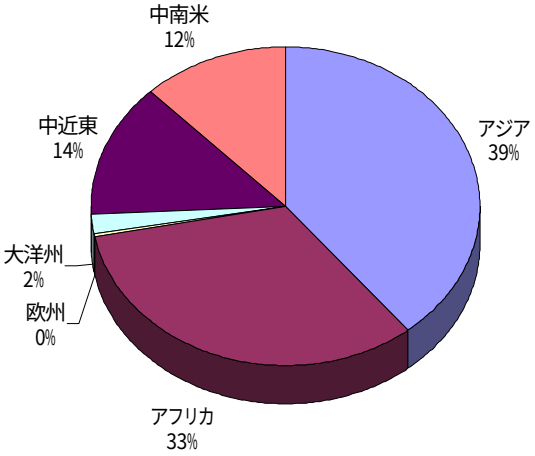
2.3　水分野における無償資金協力の金額実績（地域別、分野別）

水分野に係る無償資金協力プロジェクトが実施された地域およびセクター別の協力実績は次のようになる。

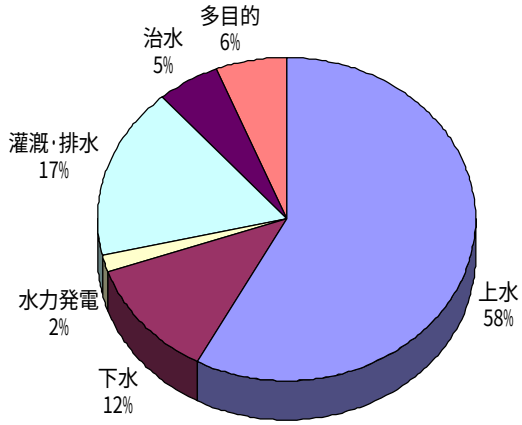
無償資金協力地域分布 —（1977 年-2000 年）— 無償資金協力セクター別分布

地域	協力金額（千円）	件数	セクター	協力金額（千円）	件数
アジア	204,008,396	135	上水道	300,644,797	202
アフリカ	169,630,000	134	下水道	61,369,000	34
欧州	1,117,000	1	水力発電	9,004,000	11
大洋州	10,840,000	11	灌漑・排水	88,754,000	69
中近東	70,964,000	40	治水	27,863,599	25
中南米	62,753,000	45	多目的	31,677,000	25
合計	519,312,396	366	合計	519,312,396	366

なお、1977 年から 2000 年までの総予算額は 4 兆 4,628 億円である。
出典：国際協力事業団年報（2002）。金額は E/N 額[1]です。



地域分布



セクター分布

出典：JICA 実績データより作成。

（注）小数点以下の数字は四捨五入している。

以上出典：「水資源プロジェクト研究　2002 年 3 月」、
「国際協力事業団年報 2002 年度版」

[1] E/N 額：政府間合意された援助供与内容の交換公文(Exchange of Note)に記された金額。

３．上水道セクターの主な協力事例

3.1 【タイ国水道技術訓練センタープロジェクト】

(1) フェーズ１（1985 年から 1991 年：無償資金協力、プロジェクト方式技術協力）

1) 目　的

タイ国水道事業の主たる部分を所管する首都圏水道公社（ＭＷＡ）と地方水道公社（ＰＷＡ）は、それぞれ所管地域の要求に合わせた拡張計画を立て給水能力の拡張を進めているが、これらの推進に必要な人材が不足している。この問題を解決する為に、ＭＷＡとＰＷＡはそれぞれ独自に訓練を始めたが、訓練教官の不足、訓練施設・訓練機材・訓練予算の不足で十分な訓練が出来ない。この状況を打開する為に、タイ国水道事業の人材育成をより効果的に、また一元的に行う為、ＭＷＡとＰＷＡは共同で全国規模の水道技術訓練センター設立し人材育成を実施する計画をたてた。

水道技術訓練センターは、中央訓練センターと 2 箇所の地方訓練センターから構成され、中央訓練センターでは、日本からの技術協力をもとにした訓練教官の養成、およびＭＷＡ職員とＰＷＡタイ中央部勤務職員の技術レベル別、職種別訓練を行う。地方訓練センターでは、中央訓練センターで教育されたタイ人教官によってＰＷＡの地方職員を対象に、技術レベル別、職種別に行った。

2）相手国機関

- 首都圏水道公社（ＭＷＡ: Metropolitan Waterworks Authority）
- 地方水道公社　（ＰＷＡ: Provincial Waterworks Authority）

3） 内　容

a) 施設、設備

中央訓練センター施設　バンコック市

- 施設：研修棟 2,335m^2、宿泊棟（60 人宿泊可能）1,044m^2、作業場 412m^2、ポンプ運転訓練棟 272m^2、車庫・倉庫 150m^2、食堂 230m^2 他。
- 訓練用プラント：小型浄水場、ポンプ運転訓練場、漏水調査訓練場、配管訓練場（本施設はタイ国側負担工事）
- 訓練機材：電気、機械、計装、漏水探知、水質実験、視聴覚、印刷等。

地方訓練センター施設　2 箇所（チェンマイ市、コンケン市）

- 施設：研修棟 650m^2、宿泊棟（32 人宿泊可能）616m^2、作業場 160m^2、車庫 48m^2、食堂 96m^2 他。
- 訓練機材：電気、機械、計装、漏水探知、水質実験、視聴覚、印刷等。

b) 専門家派遣　プロジェクト方式技術協力

長期専門家 11 名（水道計画、経営管理、浄水・水質、管路・維持、機械・

電気）。
短期専門家 13 人（水道管理、経営管理、送配水管理、水質分析、水生生物、視聴覚技法）。

c) 研修受入（日本）28 名
水道計画コース 4 名、経営管理コース 11 名、浄水・水質コース 4 名、管路・維持コース 4 名、機械・電気コース 5 名。

d) プロジェクト経費：無償資金協力 1,888,091 千円（1985、1986 年）、
プロジェクト方式技術協力 572,320 千円（機材供与、専門家派遣）

e) 結果
当センターで研修を受けた訓練生は、1987 年の第 1 回目に 156 名、以後毎年 150 から 200 名がここで訓練を受け、1991 年までの間に 1000 名近くが管理や技術を習得した。JICA は、1990 年に本プロジェクトの評価ミッションを派遣し、教育訓練に必要な運営管理技術、講師の養成、教材の開発、コース別技術移転達成状況（水道計画、経営管理、浄水・水質、管路維持、機械・電気設備）の項目について評価した。その結果、教育訓練の進捗状況および達成度に応じて短期専門家を適切に追加・配置した。講師の養成、管路維持コース、機械・電気設備コースは更なる追加訓練が必要であったが、それ以外の項目は概ね当時のタイ国の経済発展程度および技術力に見合った人材育成という当初の目標を達成した。

(2) フェーズ２　(1994 年から 1999 年：プロジェクト方式技術協力)

1) 目　的

フェーズ１終了後、タイ国の急速な経済発展によって水道水の需要は著しく増加し、生活排水、工場排水による河川の汚染が進行して従来の水処理方法では対応出来なくなりつつあり、日本の高度な水道技術を駆使し現在のタイ国の状況に対処出来る人材養成が必要となった。また、タイ国ソンクラ市をはじめとする南部地域は地理的・社会的に他の地域と条件が異なっておりフェーズ I で移転した技術では対応困難な状況となったので、南部地域の特殊性に対処が出来る人材養成が必要となった。そこで、フェーズ II のプロジェクト方式技術協力が 1994 年より開始された。

フェーズ２ではフェーズ１の結果を踏まえて、また時代背景、地域性を考慮して次の目的を設定した。

- タイ国の水道技術分野における同訓練センターの機能を強化する。
- 日本の高度な水道技術を駆使し､現在のタイ国の状況に対処出来る人材を養成する。
- 南部地域の特殊性に対処が出来る人材を養成する。
- タイ国特有の水道課題を解決する研究開発の出来る人材を養成する。

2）相手国機関

- 首都圏水道公社（MWA: Metropolitan Waterworks Authority）
- 地方水道公社（PWA: Provincial Waterworks Authority）

3） 内　容

a) 施設：ソンクラ漏水調査訓練ヤード（1996 年）、ノンソンホン水道施設改良（1998 年）

b) 訓練機材：車両、ビデオ顕微鏡、ポンプ運転シミュレーター、漏水探知器、ガスクロマトグラフィー、膜処理プラント等。

c) 専門家派遣

長期専門家 13 名（水道計画、経営管理、浄水・水質、管路・維持、機械・電気）。

短期専門家 49 人（水道管理、経営管理、送配水管理、水質分析、水生生物、視聴覚技法）。

d) 受講者：首都圏水道公社職員；503 人、地方水道公社職員 462 人。合計 965 人。

e) 研修受入（日本）22 名

水源開発管理手法と解析 2 名、科学的漏水防止 1 名、経営管理 7 名、浄水処理の高度化技術 4 名、水運用制御 5 名、無収水量制御 3 名。

f) 第三国研修

東南アジア諸国の研修員に対して、タイ人および日本人専門家が「上水道技術」分野の訓練を実施した。毎年 10− 12 カ国、約 18 名の研修員を受け入れ、約 5 週間の研修を行った。合計で 100 名を越える研修員が、ここで訓練された。

g) プロジェクト経費：施設 567,200,000 バーツ（約 18.4 億円）（1996、1998 年）、機材供与 464,000 千円

h) 結果

具体的な活動として、水資源管理、浄水処理の高度化技術、水運用制御、無収水量制御、営業事務の各分野について人材の養成を実施した。また、タイ国水道に特有な課題を解決する為の研究開発を、水源開発管理手法と解析、最適浄水処理、科学的漏水防止、経営管理の分野について指導した。プロジェクトは一定の効果をあげ、タイ国は東南アジアの成長センターとして順調に発展をとげ、それとともに水需要の増大、汚染された河川水利用の困難な課題にもこれらの訓練センターで技術を磨いた水道技術者は十分に対応している。また、現在、同センターは南南協力の拠点として第 3 国研修を東南アジア諸国を対象に実施しており、東南アジア諸国の水道技術の向上にも多大な貢献をしている。

カンボディア国プノンペン市上水道整備計画には、本訓練センターで研修し水道局で働くタイ人技術者が第 3 国専門家としてプノンペン市水道公社に派遣され、1999 年に浄水プロセスおよび 2000 年に水中微生物に関する指導

を行っている。

(3) 南南協力支援

1) 南南協力とは

途上国間協力（南南協力）とは、開発途上国が他の開発途上国に対し、経済開発、社会開発を目的として行う協力のことをいう。具体的な形態としては、より発展した開発途上国あるいは中進国が他の開発途上国に協力するものが中心になる。JICA としても、開発途上国の援助国化を支援するとともに、開発途上国の経験やノウハウを、より発展の遅れた国に生かすことは非常に有益であるという認識のもと、南南協力支援に積極的に取り組んでいる。具体的な効果としては、開発途上国間の地域協力支援、援助資金不足の解消、効率的な技術移転、援助支援の有効活用、などがあげられる。

2) プロジェクトの背景

日本が得意としてきた浄水場や配水管網等水道施設整備（都市水道）の援助は、1970 年のジャカルタから始まりビエンチャン市、バンコク市、コロンボ市、ハノイ市、プノンペン市等で実施された。アジア主要都市の水道整備は日本の技術協力に負うところが大きいが、水質の安全確保や無収水率の低下など改善しなければならない課題も多く残されている。水道施設整備に伴い技術者の裾野を広げる人材育成が必要となり、東南アジア諸国の水道技術向上が望まれた。そこでタイ国の「水道技術訓練センター」プロジェクトが開始され、以後順調に推移し、同センターで技術を磨いたタイ国の水道技術者が水需要の増大、汚染された河川水利用の困難な課題にも十分に対応している。この技術と経験を、他の東南アジア諸国にも活用して東南アジア諸国の水道技術の向上に役立てる計画が持ち上がった。経済発展、文化の似ている国同士の技術交流は効果的な技術移転が出来るので、タイ国の「水道技術訓練センター」および技術者を南南協力の拠点として活用することになった。

3） 目　的

水道供給技術およびその他の関連研究の知識を習得させる。また、研修参加国の事情に応じた水供給技術利用上の問題解決を可能にさせる。さらに、実習と観察を通じて実務的な技術を習得させる。

4）第 3 国研修

１９８５年から１９９１年まで実施された無償資金協力やプロジェクト方式技術協力（フェーズⅠ）の成果をもとに、タイ側の技術を近隣諸国に技術移転することを目的として、タイ国政府の要請に基づき 1992 年– 2001 年度まで実施された。研修員の招へいはインドネシア、マレイシア、フィリピン、カンボディア、ラオス、ヴィエトナム、ブータン、バングラデシュ、ネパール、パキスタン、スリランカ、フィジー、パプアニューギニア、サモアの１４カ国で、毎年タイ国か

ら約４名、これら周辺国から約 18 名の研修員を受け入れ、約 5 週間の研修を行った。合計で 100 名を越える研修員がここで訓練された。

研修内容：水道供給技術及びその他関連研究の知識を習得する。
研修参加国の事情に応じた水道供給技術利用上の問題解決を可能にする。実習と観測を通じて実際的研修を習得する。
研修項目：各年度とも同じ項目で実施された。
首都および地方水道管理、コンピューター・支部事務所見学、水資源と施設、水処理、水質管理、地方訓練センター見学、ミニプラント運営、ポンプとバルブの選択、プロセス装置、水力発電プロジェクト現場研修、水配分システム、ポンプ操作と制御、配水ポンプ場視察、パイプライン敷設、水道メーター工場見学、水源視察、地下漏水探索、保守概念

また、特にプノンペン市水道公社の水道技術者を、1999 年度と 2000 年度に 2 人づつ「水道技術訓練センター」に派遣して研修させた。

５）第 3 国専門家派遣

カンボディア国プノンペン市上水道整備計画には、タイ国「水道技術訓練センター」で研修し首都圏水道局で働くタイ人技術者が第 3 国専門家としてプノンペン市水道公社に派遣され、1998 年度（6 ヵ月間）に浄水プロセスおよび 2000 年度（6 ヵ月間）に水中微生物に関する指導を行っている。

3.2 【カンボディア王国　プノンペン市水道整備プロジェクトおよび関連技術協力】

(1) プロジェクトの背景

カンボディア王国では、ポル・ポト政権と 10 年以上の内戦が続き、国内の多くのインフラ設備が破壊されてしまった。首都プノンペンの水道施設も例外ではなく、破壊されたり、著しく老朽化し、維持管理も行われず市内の給水状況は極度に悪化していた。国連暫定統治機構（United Nations Transitional Authority in Cambodia: UNTAC）の発足に続いて総選挙が行われ新政府が樹立し、1993 年各国・国際機関の協力で経済復興支援が開始される運びとなった。この 1993 年当時では、1960 年代に 155,000m^3/日あったプノンペン市の給水能力が 63,000m^3/日まで落ち込んでいる状況であった。また、水圧の低下により、市街地周辺の住民には断続的な給水しか行われず、人々は水汲みや水売りに依存して生活していた。配水管路においても、長年維持管理も行われなかったことから、漏水率は 70%以上にも達していた。これら施設の問題に加えて、料金徴収等の制度面での問題も大きく、所謂健全な水道事業とはいえない状況であった。

(2) 目的

上述した内戦後の悲惨な状況を復興させるために、我が国の上水道整備に関する援助は 1993 年の開発調査「プノンペン市上水道整備計画」から開始された。この開発調査では、2010 年を目標年次としたマスタープランを作成したが、プノンペン市住民の最小限必要となる水需要を満たすため緊急的に水道給水量を増加させることおよび、給水水質を改善することが計画目標であった。

(3) 機関

プノンペン市水道公社（PPWSA: Phnom Penh Water Supply Authority）

(4) 協力内容

ＪＩＣＡが作成したマスタープランに沿って、我が国の援助並びに他の国際援助機関やドナー（世銀、UNDP、ADB、フランス等）による援助が開始され、それらが上手く連携してプノンペン市の上水道整備が進められてきた。実施された我が国の援助実績は以下の表に示すとおりである。

プノンペン市上水道整備計画に対する協力

プロジェクト名	スキーム	期　間	供与額（億円）	内　　容
プノンペン市上水道整備計画	開発調査	1993		マスタープラン策定：目標年 2010 年 緊急改修計画策定
プノンペン市上水道整備計画	無償資金協力	1993-1994	27.51	プンプレック浄水場（100,000㎥/日）改修、配水地新設、配水ポンプ取替え、高架水槽の改修
第 2 次プノンペン市上水道整備計画	無償資金協力	1997-1999	21.12	市中心部 7th January、Toul Kork 地区の一部の配水管網の整備（67㎞）。水道メーター供与（15,000 個）。
プンプレック浄水場拡張計画	無償資金協力	2001-継続中	25.80	プンプレック浄水場の 50,000㎥/日の拡張および改修。

出典：本章参考文献のカンボディア国プノンペン市水道整備事業に係る調査報告書をもとに作成。

上表に示した我が国の援助は主にハードの整備の部分であるが、内戦時代に多くの技術者層、知識階級が殺されたり、亡命しており、人材不足が非常に深刻な状況となっていた。そこで、我が国の援助でも施設整備の完成に合せて人的支援も継続的に行ってきた。これまで実施されてきた我が国の人的支援は次表に示す通りである。

人的協力

人的支援	指導内容	派遣期間
短期専門家派遣	上水道施設維持管理（配水システム）	1999 年 4 月-10 月
短期専門家派遣	上水道施設維持管理（機械設備）	1999 年 9 月-2000 年 3 月
短期専門家派遣	上水道施設維持管理（電気設備）	2000 年 5 月-2001 年 2 月
南南協力：		
第 3 国専門家派遣	水質分析・管理（浄水プロセス）タイ国	1998 年-1999 年
第 3 国専門家派遣	水質分析・管理（主に水中微生物）タイ国	2000 年 5 月-10 月
国民参加型援助：		
青年海外協力隊員派遣	水質検査	1998 年 10 月-2000 年 10 月
青年海外協力隊員派遣	水質検査	2001 年-継続中
開発パートナー事業[2]	テレメーターシステム　（北九州市）	2001 年-2002 年
援助協調：	WB、ADB、UNDP、フランスとの連携	1993 年-

出典：本章参考文献のカンボディア国プノンペン市水道整備事業に係る調査報告書をもとに作成。

上表の短期専門家派遣を通して、派遣元の地方公共団体とプノンペン市水道公社（Phnom Penh Water Supply Authority: PPWSA）との友好関係が形成された。また、特筆すべきは、専門家派遣がきっかけとなり、北九州市水道局は「小規模パートナー事業」として、PPWSA に対してテレメータシステム設置を 2001 年から 2002 年に実施し、大きな効果を上げている。

《開発パートナー事業》
北九州市水道局がテレメーターシステム技術協力と技術移転・人材育成を実施した。プノンペン市水道公社は、「一点注入式の配水ブロック化」配水方式を構築する計画である。北九州市水道局は、既にこの方式を完成させ、そのシステムを用いた効率的な維持管理に係わる豊富な経験を有しているので、機材供与も併用して技術移転をはかりプノンペン市水道公社の安定経営を図る目的で実施された。

また、我が国による援助は上述したとおりであるが、最初に策定されたマスタープランにそって他のドナーによる協力も継続して実施されてきた。他ドナーによる援助をまとめると次表のとおりとなる。

[2] 開発途上国のニーズが多様化する中、小規模できめの細かい対応が必要な社会開発分野等について、日本の NGO, 地方自治体、大学、民間企業などと連携して実施する協力。1999 年度より実施されている。

他ドナーの援助実績

項目	内容	実施期間	資金源	金額
チャンカーモン浄水場	ろ過池改修 (20,000m³/日)	1993～1994	フランス無償	US $3,260,000
ドンペン地区	配水管整備 （55km）	1993～1996	フランス無償、自己資金	US $4,907,000
チャンカーモン地区	配水管整備 （60km）	1997～1999	ADB、世銀ローン、自己資金	US $2,270,000
チャンカーモン浄水場	拡張及び改修 (10,000m³/日)	1996～1997	フランス無償・自己資金	US $5,300,000
市内送水管システム	送水本管整備 （16km）	1999～2001	ADB ローン	US$12,200,000
Toul Kork, Boeng Salang 地区	配水管整備 （97km）	1999	世銀ローン、自己資金	US $2,820,000
チュルイチャンワー浄水場	新規建設 （65,000m³/日）	2000～2001	世銀ローン	-
市街部	配水管網更新	2000～2001	ADB、世銀ローン	-
市街近郊部	配水管網整備	2000～2005	ADB、世銀、フランス	-
市内	送水システム新設	2001～2002	ADB ローン	-

出典：本章参考文献のカンボディア国プノンペン市水道整備事業に係る調査報告書をもとに作成。

上表に示したプロジェクトは主にハード整備の援助であるが、他ドナーにおいても人材育成、あるいはシステム整備といったソフト面での援助を重要視しており、以下の表に示すようなソフト面での援助も実施されてきている。

他ドナーによる人材育成等ソフト面での援助実績

機関	期間	内容
UNDP/WB、フランス	1994～1998	水道料金請求システム、台帳整理、顧客調査等
ADB ローン	1997～1999	組織・運営支援のための資機材の強化（OA 機器、配管敷設用車両及び機械類）
世銀ローン	1997～2001	運転改善技術（漏水制御専門家、トレーニング専門家）及び財務改善（会計ソフト専門家）協力
世銀ローン	1998～2002	漏水探査・トレーニング機材、会計システム用コンピュータ、貧困層の給水接続促進のための回転資金貸与

出典：本章参考文献のカンボディア国プノンペン市水道整備事業に係る調査報告書をもとに作成。

（5） プロジェクトの効果

上述したとおり、我が国の社会開発調査によって策定されたマスタープランを基に、我が国はもとより他ドナーの援助が連携して実施されてきたが、これら援助によりプノンペン市水道がどのように改善したのか、内戦終了時の 1992 年と 2000 年初頭の給水関連数値で比較する。

プロジェクトの効果

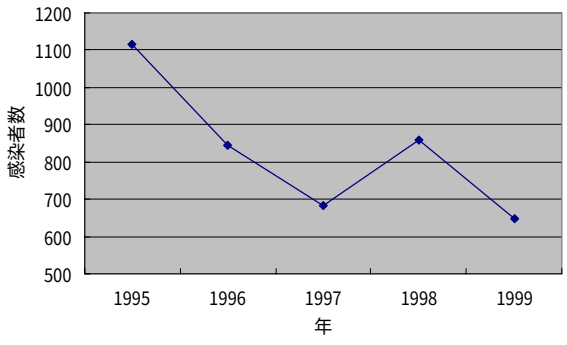
項目	1992 年（内戦終了時）	2000 年初頭
市総人口	約 70 万人	約 105 万人
給水人口	約 13 万人	約 33 万人
給水普及率*	35%	60%
浄水能力	約 6 万m^3/日	約 12 万m^3/日
給水時間	不連続、約 12 時間/日	連続、24 時間/日
給水水圧	ほぼ 0	0-10m
水質	飲用不適	改善
メーター接続率	12%	99.5%
有収率	約 20%	61.7%
料金徴収率（水量ベース）	40%	91.7%
1000 栓当たり職員数	18 人	7 人

＊：2000 年初頭は、主な給水区域である市街地部人口を本に算出。1992 年は市街地部人口データがない為に 2000 年と同じ市街地部人口比率を基に市街地部人口を推定し、給水普及率を算出した。

浄水場あるいは送水管・配水管網の整備により、浄水能力がほぼ 2 倍に回復し、これにより給水人口が増加、給水時間も連続して給水できるようになった。また、給水の品質として、圧力と水質が挙げられるが、これらについても非常に改善されていることがわかる。管路の整備により漏水率が減少し、有収率が 60%以上にまで回復している。

また、給水事業の改善により市民の保健衛生環境も改善されてきた。下図は 1995 年以降の水因性疾病（赤痢、腸チフス、コレラ）の年間感染者数を示している。これは、通院記録を基にしたデータであり、通院が困難な貧困者層は含まれていないと思われるが、感染者数の減少していることがわかる。

水因性疾病感染者数（プノンペン市）



出典：本章参考文献のカンボディア国プノンペン市水道整備事業に係る調査報告書をもとに作成。

3.3 【スリランカ国コロンボ市の水道整備に係る技術協力】

（1）プロジェクトの背景

人口 290 万人、面積 580km^2 の大コロンボ圏の水道は、ケラニ川を主要な水源として同圏の人口の 48%に対して給水しているが、同圏の水需要は近年急速に伸びており給水量の確保および関連水道施設の整備は緊急の課題である。

1990 年以降、JICA、国際協力銀行（JBIC）により給配水施設の整備・拡張の協力がなされている。しかし 1998 年 2 月に実施された「コロンボ東部上水道事業」に係わる援助効果促進調査（国際協力銀行プロジェクト）では、大コロンボ圏の無収水率は 47%に達し、特にコロンボ市に限れば 57%と際立って無収水率の高いことが指摘された（出典：コロンボ市上水道改修事業実施設計調査：1999 年 12 月−2001 年１月）。その主な原因は、システム漏水 28%、貧困層居住地域での漏水・無駄水・料金未徴収 19%、違法接続（盗水）5%等と推定されている。大コロンボ圏の水源が限られていることから、コロンボ市内の老朽化した上水道システムを改修し、57%もの高い無収水率の主な原因である漏水を削減する必要がある。また、事業体の経営改善の観点からも料金体系整備や違法接続対策を実施して収入のベースを拡大していくことが不可欠である。

このような状況を背景として、スリ・ランカ国政府の要請により JICA は、JBIC の有償資金協力と連携を取って、より効果的な援助を進めている。またこれらの調査、施設整備と併せて技術者の訓練・教育も実施した。

（2）目的

コロンボ市内の上水道システムを改善し、給水量の確保と関連水道施設の整備を効果的に実施するとともに無収水率を下げる。

（3）相手国機関

住宅・建設・公共事業省、国家上下水道公社

（4）協力の内容

次表に、協力内容を纏めた。

スリランカ国の上水道改修事業に対する協力

プロジェクト名	種類	完了年	金額（億円）
飲料水供給改善計画	無償資金協力	1983	12.0
コロンボ上水道処理場改善計画	無償資金協力	1984	14.9
飲料水供給計画	無償資金協力	1986	6.7
キャンディ上水道改善計画	無償資金協力	1989	8.5
キャンディ上水道改善計画	無償資金協力	1990	7.5
アンバタレ浄水場整備計画	無償資金協力	1992	1.3
アンバタレ浄水場整備計画	無償資金協力	1993	33.1
地方飲料水供給改善計画	無償資金協力	1995	8.2

大コロンボ圏給水拡張計画調査（F/S）	開発調査	1994	—
大キャンディ圏・ヌワラ地域上下水道整備計画調査	開発調査	1998	—
ヌワラ地域給水改善計画(1/2)	無償資金協力	2001	4.8
人材育成：			
短期専門家派遣（上水道開発計画）1名	派遣事業	1996	—
専門家派遣（上水道開発計画）3名： 1997、2000、2002	派遣事業	2002	—
研修員受入　1名（上水道施設 II）	派遣事業	1999	—
研修員受入　3名（上水道開発計画、上水道施設技術、無収水削減計画）	派遣事業	2000	—
南南協力：			
第3国研修（タイ国水道技術訓練センター） 上水道1名	派遣事業	1999	—
第3国研修（タイ国水道技術訓練センター） 上水道3名	派遣事業	2000	—

参考：　　国際協力銀行（JBIC）の協力

プロジェクト名	種類	完了年	金額 （億円）
コロンボ東部上水道事業	有償資金協力	1990	20.0
大コロンボ圏上水道拡張事業（南部地域）	有償資金協力	1993	37.3
コロンボ北部上水道供給計画	有償資金協力	1996	53.1
カル河水源開発・給水拡張計画	有償資金協力	1997	112.8
コロンボ市上水道改修事業	有償資金協力	1999	42.2
キャンディ上下水道整備事業	有償資金協力	1993	51.5

出典：国際厚生事業団「水道分野の ODA 方針検討会」資料から一部引用。


JICA
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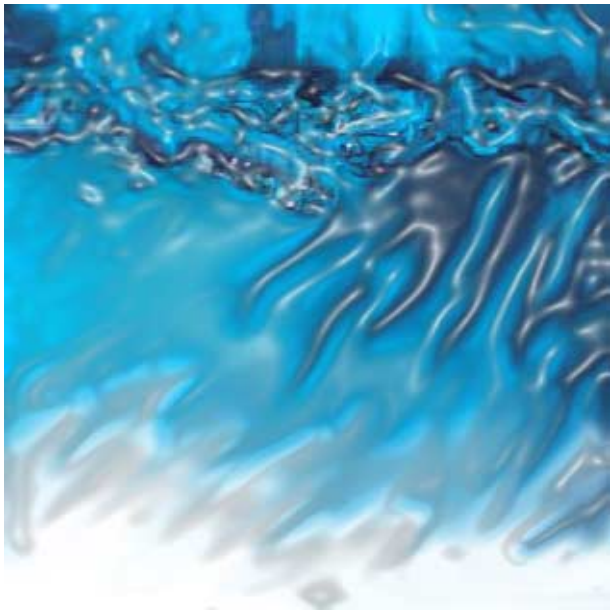
AGENCY

3.　セッション「共通の水資源である地下水の管理手段としての所有権」



第 2 次水資源プロジェクト研究計画調査

Groundwater Management in Viet Nam

Vice Director of CERWASS
Le Thieu Son

Center for Rural Water Supply and Environmental Sanitation

The Third World Water Forum
Groundwater Management in Viet Nam
Le Thieu Son

Content:

Part 1: The law on water resources

Part 2: National Rural Water Supply and Sanitation Strategy

Part 3: Groundwater development project in Central Highlands of Vietnam Supported by JICA

Center for Rural Water Supply and Environmental Sanitation

Part1. The Law on Water Resource

Contents of the Law

Main subjects will be presented as followings;

- Ownership of water resource
- Protecting, exploiting and using water resource
- Management of water resource
- International relations on water resource

Ownership of water resource

" The water resource come under the ownership of the entire people under the unified management of the State".

Protecting water resource

"Organisations and individuals have the responsibility to protect the water resource".

" Organisations and individuals that conduct geological exploration drills or exploitation drills for underground water, or that prepare for the laying of foundations of constructions must take measures to protect underground water resource".

Management of water resource

- The government exercises unified State management of the water resource
- The Ministry of Agriculture and Rural Development (MARD) is answerable to the Government for the carrying out of the State management function on water resource
- The People's Committees of the provinces and cities shall take responsibility for conducting State management over water resources.

International relations on water resource

"The State encourages the broadening of international relations and international co-operation in the basic survey, protection, exploitation and use of water resource".

Part2. National Rural Water Supply and Sanitation Strategy (NRWSS)

Why do we need a National Strategy?

- Clean water play important role in human life
- Recently about 50% of rural people don't access clean water
- Close concerned with water resources

The Government gives high priority to rural water supply and sanitation development and has decided to make NRWSSS one of most important national target programs

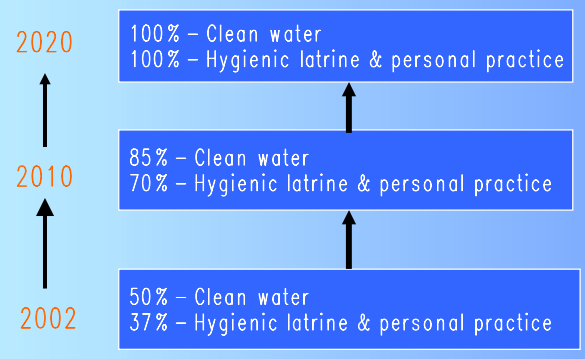
Objectives of NRWSSS

Development Objectives

- Improved Health of the Rural Population
- Improved Living Conditions
- Reduced Environmental Pollution

Objectives of NRWSSS

Immediate Objectives



Implementation Guideline

Five guidelines;

- Users will decide on the selection of technology
- Users shall pay all construction costs and O&M costs. Government support…
- IEC programs
- Effective operation and management arrangements
- Advanced and appropriate technologies

Main Solution

Main solutions are as followings;

1. **IEC & community participation**
2. **State management & HRD**
3. **Mobilisation of funding sources**
4. **Appropriate technologies**
5. **International co-operation**

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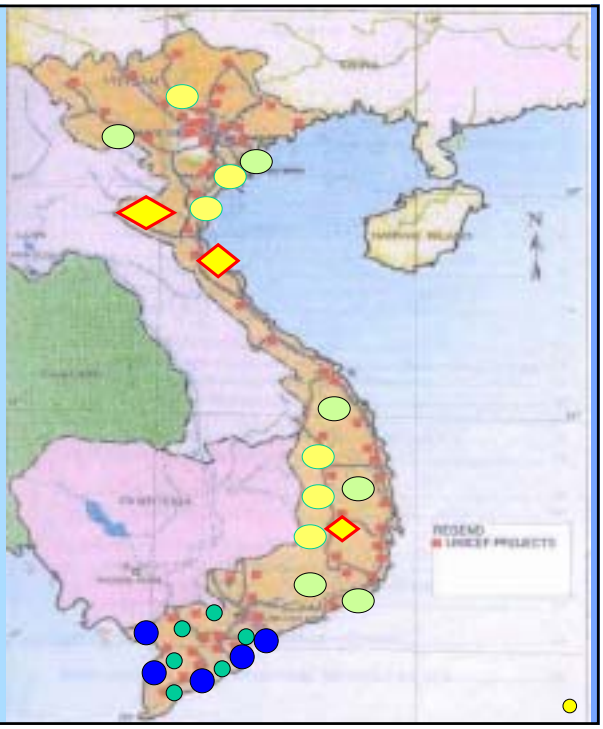
International co-operation on RWS

- UNICEF 29 Pro.
- WB 6 -
- JICA 6 -
- AusAID 5 -
- DANIDA 3 -
- NGOs



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Part3. Groundwater development project in Central Highlands of Vietnam supported by JICA

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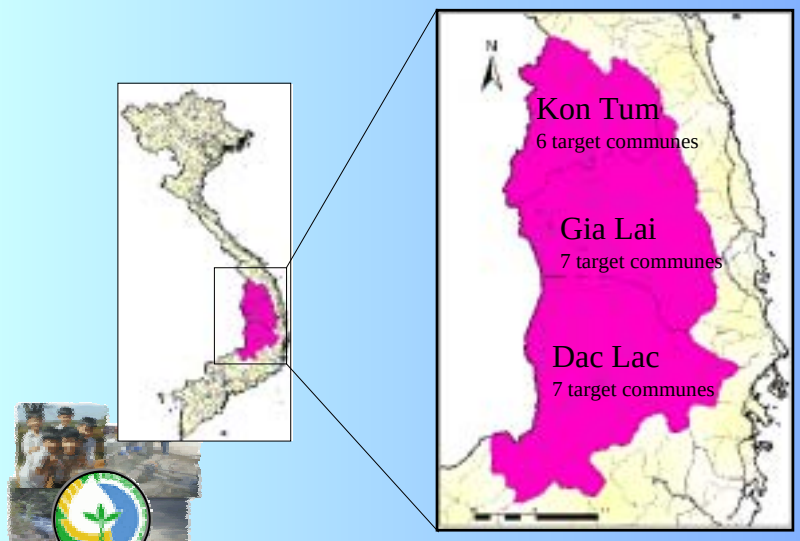

Location Map

Objective of the project

- To evaluate groundwater potential
- To develop a long-term water supply plan
- To conduct a F/S for selected priority commune
- Technology transfer for Vietnam side

Groundwater investigation

- Information collection
- Site survey
- Geophysical investigation
- Drilling work (20 deep wells)
- Pumping test
- Groundwater quality test

Groundwater management procedure in the Project

- PCERWASS submit investigation form to DARD for permission
- Local drilling company drill tube well follow design by JICA study team included pumping test and aquifer test
- Report investigation result to DARD
- Monitoring
- Exploitation and monitoring

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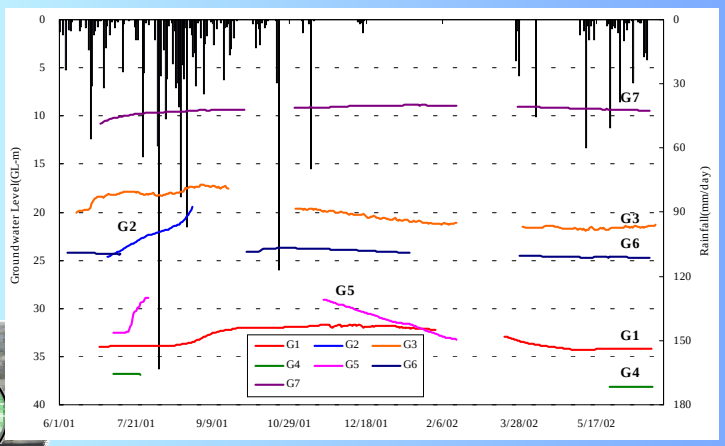
Groundwater monitoring



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Pilot Model Plant

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Lessons learned from JICA project

- Investigation methods
- Water resources protection & sustainability
- Technology transfer for local people
- Community participation

People know, people discuss, people do & people manage

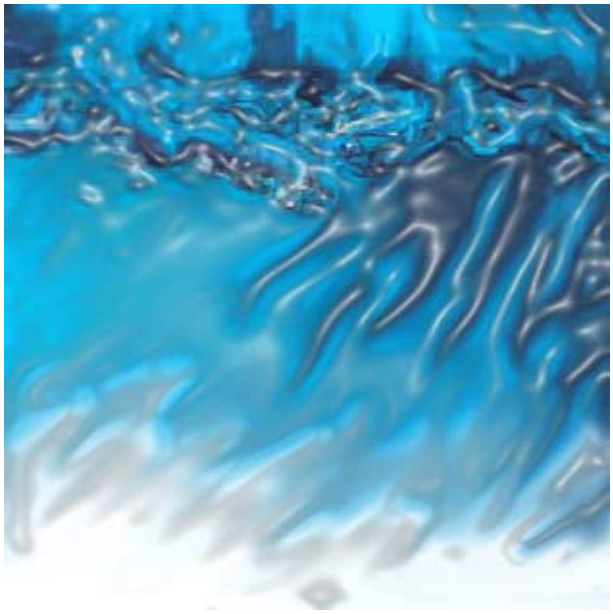
Center for Rural Water Supply and Environmental Sanitation

Thank for your attention

http://www.cerwass.org.vn

Center for Rural Water Supply and Environmental Sanitation

III.　収集資料・ビデオ・録音テープ



第 2 次水資源プロジェクト研究計画調査

目　録

主管部長	文書管理課長	主管課長	情報管理課長	技術情報課長

収 集 資 料 リ ス ト

地域		調査団等名称	第2次水資源プロジェクト研究	調査の種類		作成部課	
国名				現地調査期間	2003年 3月16日～2003年 3月21日 年　月　日～　年　月　日	担当者氏名	

平成　年　月　日 作成

番号	資料の名称	形態	版型	ﾍﾟｰｼﾞ数	ｵﾘｼﾞﾅﾙ・ｺﾋﾟｰの別	部数	収集先名称又は発行機関	寄贈・購入の別	取扱区分	利用表示	利用者所属氏名	納入予定日	納入確認欄
1	Operation and maintenance network To share Knowledge, experience and information on operation and maintenance of water supply and sanitation	パンフ	A4	8	オリジナル	1	Operation and maintenance network National institute of public health Water supply & sanitation collaborative council	寄贈					
2	Chapter 8: Water reuse outside the United State (Draft)	ﾚﾎﾟｰﾄ	A4	77	オリジナル	1	Operation and maintenance network National institute of public health Water supply & sanitation collaborative council	寄贈					
3	Sustainable and Secure Water Delibery and Flood Control Systems Session Materials	ﾚﾎﾟｰﾄ	A4	77	コピー	1	Association of Japanese consulting Engineers International Federation of Consulting Engineers	寄贈					
4	持続的で安定な水供給と洪水防御プログラム	パンフ	A4	22	オリジナル	1	日本コンサルティング・エンジニア協会 株式会社ニュージェック	寄贈					
5	Conference Announcement 2nd International Symposium on ecological sanitation ECOSAN　ecological sanitation	パンフ	A4変形	14	オリジナル	1	Dutsche Gesellschaft fur Technische Zusammenarbeit(GTZ) GmbH International Water Association	寄贈					
6	水道に関する海外技術協力の課題と今後の展望	ﾚﾎﾟｰﾄ	A4	18	コピー	1	財団法人 水道技術研究センター	寄贈					
7	上水道分野に対する海外技術協力 JICA上水道の援助実績資料	パンフ	A4	29	コピー	1	JICA 「水道に関する海外技術協力と今後の展望」セッション	寄贈					
8	The Gender Approach to Water Management, Lessons Learnt Around the Globe	パンフ	A4	15	オリジナル	1	Gender and Water Alliance	寄贈					
9	Gender in Court - List of Session participants 参加者リスト2.	ﾚﾎﾟｰﾄ	A4	1	コピー	1	Gender in Court	寄贈					
10	Woman Managing the Public Interest : A Participative Experience of Gender and Water in El Hormiguero, Colombia CD－ROM(模擬裁判で発表された各国のケーススタディのコンセプトペーパー)3.	ﾚﾎﾟｰﾄ	A4	120	コピー	1	Cinara With the support from the Gender & Water Alliance (GWA)	寄贈					
11	Tapping into Sustainability: issues and trends in gender mainstreaming in water and sanitation-A Background Document for the Gender and Water Session 3rd World Water Forum Kyoto, Japan, IRC 2003 March	ﾚﾎﾟｰﾄ	A4	94	オリジナル	1	Gender and Water Alliance	寄贈					
12	Untapped Connections-Gender, Water and Poverty: Key Issues, Government Commitments and Actions for Sustainable Development	パンフ	A4	8	オリジナル	1	Woman's Emvironment and Development Organization	寄贈					
13	Outline of plenary session	ﾚﾎﾟｰﾄ	A4	11	コピー	1	Floods	寄贈					
14	Plan of session	ﾚﾎﾟｰﾄ	A4	10	コピー	1	Floods	寄贈					
15	第3回世界水フォーラム　洪水の日　プログラム	パンフ	A4	4	オリジナル	1	「川と水」委員会事務局(IFNet)準備室	寄贈					

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16	River and land dikes for eternity An ace up our sleeve	レポート	A4	48	オリジナル	1	Ministry of transport, public works and water management Directorate-General of Public Works and Water Management Road and hydraulic Engineering Institute	寄贈					
17	Project VNK de Veiligheid van Nederland in Kaart Nederland leeft met water Overstromingen in Nederland, Kansen en gevolgen	パンフ	A4変形	10	オリジナル	1	Ministerie van verkeer en waterstaat Directoraat-Generaal Rijkswaterstaat Dienst weg-en waterbouwkunde	寄贈					
18	The CHR　International commission on hydrology of the Rhine Basin	レポート	A4	11	オリジナル	1	CHR-a permanent, autonomous commission with representatives from Switzerland, Austria, Germany, France, Luxembourg and the Netherlands	寄贈					
19	Fundamentals on Water Defences	レポート	B5	128	オリジナル	1	Technical advisory committee on water defences (TAW)	寄贈					
20	Saving residents from flooding Flood hazard Maps　Invaluable for Mitigating Flood Damage	パンフ	A4	4	オリジナル	1	Typhoon committee / Economic and sicial commission for asia and the pacific(ESCAP) / World Meteorological Organization(WMO)	寄贈					
21	From probability of exceedance to probability of flooding	レポート	A4	20	オリジナル	1	Technical advisory committee on water defences (TAW)	寄贈					
22	The Story of Mekong Cooperation	パンフ	A4	24	オリジナル	1	Mekong river commission (MRC)	寄贈					
23	Flood management and mitigation Presentation at 3rd WWF, Flood mitigation session	レポート	A4	22	コピー	1	Mekong river commission (MRC)	寄贈					
24	2002年ヨーロッパ水害調査　概要報告書	レポート	A4	12	オリジナル	1	2002年ヨーロッパ水害調査団	寄贈					
25	IFNet 国際洪水ネットワーク 効果的な洪水管理　大切な水と生命のために	パンフ	A4	4	オリジナル	1	IFNet 事務局・「川と水」委員会	寄贈					
26	Sustainable Groundwater Management by GW-Mate (WB)	パンフ	A4	60	オリジナル	1	World Bank	寄贈					
27	Groundwater-the underlying resources by IAH (International Asociation of Hydrogeology)	パンフ	A4	4	オリジナル	1	International Asociation of Hydrogeology(IAH)	寄贈					
28	基調講演要旨Dr. John C. Peck（カンサス大学教授）	レポート	A4	15	コピー	1	Property Rights in Groundwater	寄贈					
29	Solidarity for drinking water Economic aspects	レポート	A4	16	オリジナル	1	Académie de l'Eau	寄贈					
30	Looking back: The long-term impacts of water and sanitation projects A condensed version of the WaterAid research report "Looking back: participatory impact assessment of older projects"	レポート	A4	27	オリジナル	1	WaterAid	寄贈					
31	Poverty and water security	レポート	A4	29	オリジナル	1	John Soussan and Wouter Lincklaen Arriens WATER for ALL	寄贈					
32	Financing the millennium development goals for domestic water supply and sanitation	レポート	A4	23	オリジナル	1	Geraldine Terry and Belinda Calaguas WaterAid	寄贈					
33	Water and poverty initiative case study papers What we can learn and what we must do	レポート	A4	29	オリジナル	1	WATER for ALL　ADB	寄贈					
34	From the lane to the city: The impact of the orangi pilot project's low cost sanitation model A WaterAid	レポート	A4	23	オリジナル	1	Akbar Zaidi WaterAid	寄贈					

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35	Water for life WaterAid's vision is a world where everyone has access to safe water and effective sanitation	パンフ	A4	6	オリジナル	1	WaterAid	寄贈					
36	Water for poor A selection of case studies in water and poverty	ﾚﾎﾟｰﾄ	A4	63	オリジナル	2	WATER for ALL　ADB	寄贈					
37	Responding to poverty promoting productive uses of water at the household level	パンフ	A4	6	オリジナル	1	Natural resources institute, Department: water affairs and forestry Republic of South Africa, International water management institute, IRC	寄贈					
38	Reducing the vulnerability of the poor to the negative impacts of floods	パンフ	A4	20	オリジナル	1	Ian B. Fox ADB	寄贈					
39	Improving access to safe water and effective sanitation too many poor people still lack access to basic water and sanitation	パンフ	A4変形	6	オリジナル	1	Building partnerships for development in water & sanitation	寄贈					
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43	New rules, new roles　Does PSP benefit the proof? the synthesis report	ﾚﾎﾟｰﾄ	A4	36	オリジナル	1	Eric Gutierrez, Belinda Calaguas, Joanne Green, Virginia Roaf WaterAid, TEARFOUND Christian action with the world's poor	寄贈					
44	Rural water and poverty action initiative Water and poverty initiative for the 3rd World Water Forum partnerships for action to improvement water security for the poor Working document	パンフ	A4	11	オリジナル	1	ADB	寄贈					
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46	Pro-poor intervention strategies in irrigated agriculture in Asia Difficulties encountered in accessing water frequently determine the level of poverty	パンフ	A4	12	オリジナル	1	ADB, International water management institute	寄贈					
47	Poverty reduction strategy papers and water: Failing the poor? Discussion paper	パンフ	A4	8	オリジナル	1	WaterAid	寄贈					
48	(財)ダム技術センターパンフレット	パンフ	A4	4	オリジナル	1	(財)ダム技術センター	寄贈					
49	①基調講演1 "Dam rights"の要旨。	パンフ	A4	6	コピー	1	WWF	寄贈					
50	②WWF "Dam rights: an investor's guide to dams.	パンフ	A4	31	オリジナル	1	WWF	寄贈					
51	Water storage for human sustainable development by Prof. Raymond Lafitte	ﾚﾎﾟｰﾄ	A4	9	コピー	1	Dams and Sustainable Development	寄贈					
52	Making Waves Through Partnership, Stream of Knowledge	パンフ	B5変形	4	オリジナル	1	Streams of Knowledge	寄贈					

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53	Capacity building networks in water 'Lessons Learned' from WaterNet	パンフ	A4	12	オリジナル	1	Cap-Net International network for Capacity building in integrated water resources management	寄贈					
54	Establishing a Capacity Building Network for the Nile Basin" by Hesham A. GhanyIHE	レポート	A4	22	オリジナル	1	Hesham A. Ghany, Ir. J. Luijendijk 「Water, Education and Capacity Building」	寄贈					
55	世界防災白書	ちらし	A4	2	オリジナル	1	国連国際防災戦略(ISDR)事務局	寄贈					
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58	A worldwide network	パンフ	A4	2	オリジナル	1	International office for water	寄贈					
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61	Three lakes	パンフ	B5変形	6	オリジナル	1	Member of Italian Delegation	寄贈					
62	プログラム（A4:1枚）	ちらし	A4	1	コピー	1		寄贈					
63	泳げる霞ヶ浦 2020市民計画行動イメージ	ちらし	A4	2	オリジナル	1	霞ヶ浦市民社会	寄贈					
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67	流域一貫の土砂管理(貯水池土砂管理に向けた挑	パンフ	A4	4	オリジナル	1	流域一貫の土砂管理(貯水池土砂管理に向け	寄贈					
68	Shearing knowledge for equitable, efficient and sustainable water resources management	レポート	A4	120	オリジナル	1	Global water partnership	寄贈					
69	Africa Days 3rd World Water Forum, Water and Food Security Session"2003	レポート	A4	108	コピー	1	Africa Water Task Force 「Water and Food Security Session」	寄贈					
70	Responding to Poverty, Natural Resources Institute IWMI, IRC	パンフ	A4	6	オリジナル	1	Natural resources institute, Department: water affairs and forestry Republic of South Africa, International water management institute, IRC	寄贈					
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73	Partnerships for Sustainable Access to Drinking Water and Sanitation	レポート	A4	32	オリジナル	1	Union of African Water Suppliers Partnerships for Sustainable Access to Drinking Water and Sanitation Session	寄贈					
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地域	アジア	調査団等名称	第2次水資源プロジェクト研究	調査の種類		作成部課	
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H-1	″VOICES″ OF THE PEOPLE BY THE PEOPLE FOR THE PEOPLE　vol.2	パンフ	A5	8	オリジナル	1	Secretariat of the 3rd World Water Forum						
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H-5	JICA INFO-KIT　File A-2　Outline of JICA's	パンフ	A4	4	オリジナル	1	Japan International Cooperation Agency						
H-6	JICA INFO-KIT　File E-3　Gender / WID	パンフ	A4	4	オリジナル	1	Japan International Cooperation Agency						
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H-9	Water for All	パンフ	A4		オリジナル	1	Asian Development Bank						
H-10	Conclusion of Workshop on Information & Indigenous Technology to Resolve Water Issues in Bangladesh (Sep.25, 2002)	レポート	A4	2	コピー	1	Foundatioon of River & Basin Integrated Communications, Japan						
H-11	Summary of Case Study of Bangladesh, A Result of Workshop on Information & Indigenous Technology to Resolve Water Issues in Bangladesh (Sep. 25, 2002)	レポート	A4	6	コピー	1	"Water in Rivers" Secretariat						
H-12	Outline of the Foundation of River & Basin Integrated Communications, JAPAN	パンフ	A4	7	コピー	1	Foundation of River & Basin Integrated Communications, Japan						
H-13	International Flood Network	プログラム	A4	1	オリジナル	1	IFNet Secretariat						
H-14	IFNet	パンフ	A4	2	オリジナル	1	"Water in Rivers" Secretariat						
H-15	Rivers in Japan	パンフ	A4	65	オリジナル	1	Infrastructure Development Institute-Japan Japan River Association						
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H-17	IFNet　″Water in Rivers″ CD-ROM	CD			オリジナル	1	"Water in Rivers" Secretariat						