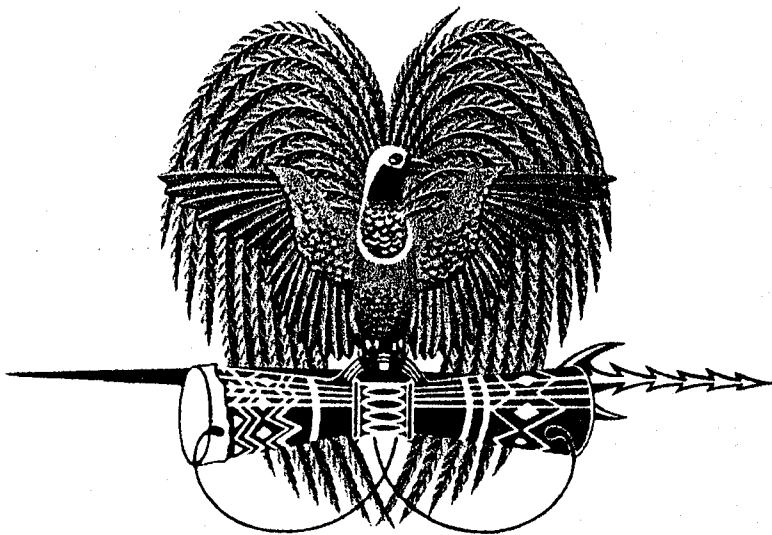


# ENSO IMPACTS ON WATER RESOURCES IN THE PACIFIC WORKSHOP.

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## PRE-WORKSHOP IN COUNTRY REVIEW FOR PAPUA NEW GUINEA



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### **Background:**

Papua New Guinea is a country of about 463,000 sq km area with a population of 4.5 million.

The main island is dominated by a rugged terrain raising to 4,300 meters on which the majority of the population live. Elsewhere, the population is concentrated on the most fertile land. The society is extremely cultural and linguistically diverse, owing to its isolated development in steep highlands valleys and the dispersal through many islands.

More than 700 languages are spoken in the country, with three official languages being English, Tok Pisin and Motu which helps to draw the country together.

The country is economically diverse with coffee, tea, copra, cocoa, timber, fishing, oil palm and mining being the major export commodities. Subsistence farming is still a dominant feature forming the main fabrics of living standard in rural settings.

For administrative purposes, the country is divided into 19 provinces plus the National Capital District in Port Moresby. The provinces are then divided into districts and sub-divided into local level Governments (LLGs). For the purposes of Disaster Management, PNG has a National Disaster Act and supporting National Disaster Plan prepared in 1987. The disaster Management system in so far as the preparedness and response are concerned is headed by a National Disaster Committee (NDC). NDC is responsible to cabinet, the National Executive Council (NEC).

The NDC is composed of the secretaries of selected departments, Chaired by the Secretary of the Department of Provincial & Local Government Affairs (Do PLLGA). There are lower level disaster committees in provinces and districts.

A permanent National Disaster and Emergency Services (NDES) a headquarters organization constituted within the Do PLLGA, is responsible for the operational co ordination of emergency response including logistics and communications.

Papua New Guinea was among the countries in the South West Pacific region that bore the blunt effects of the recent (1997/98) El niño episode. Whilst very little life was lost, the actual impacts in terms of the environmental, social and economic losses was phenomenal. Monetary losses have been estimated to have ran into hundreds of millions of kina mainly due to losses in mineral receipts at Ok Tedi and Porgera Gold/Copper mines and depleted cash crops receipts due to the drought and frosts.

**Although the climatic anomalies associated with the 1982/83 episode seem to be relatively worst than for the 1997/98 episode, the actual impacts of the later far outweighed the other in terms of monetary losses which obviously have translated to negative socio-economic anomalies in the country after the event.**

## **THE PNG NATIONAL WEATHER SERVICE**

The Papua New Guinea National Weather Service operates a small meteorological service, which is part of the Department of Transport and Civil Aviation. Although it is vested with the provision of meteorological services to both the Aviation and the public in the Country, it is 90% aviation oriented. Most of the stations, which are presumably reliable, are located at airports.

## **THE METEOROLOGICAL NETWORK IN PNG**

Currently there are 14 official NWS stations manned by PNG NWS personnel and a further 16 climate and about 100 rainfall stations operated by volunteer observers.

The length of records of each of the stations that is currently stored in the database varies from a few months to about 25 years.

## **CLIMATE RELATED HAZARDS IN PAPUA NEW GUINEA**

The location of Papua New Guinea probably makes it the most optimum location of Climate related Disasters. Potential Disasters and Natural Hazards include:

### 1. Droughts

The drought season is the same as the frost season. The areas affected in order of intensity are the Southern PNG provinces, the Highlands, the Northern New Guinea Mainland provinces and lastly the New Guinea Islands region provinces.

### 2. Frosts

Areas above 2100 metres in the Highlands are subject to frost though there is little data on the frequency or geographical distribution. The season is from May to October. As the population has increased there has been a tendency to establish settlements or gardens above the frost line. Although the sweet potato is capable of growth at higher altitudes than other traditional crops it is still a tropical crop still affected by freezing. There were originally reports of widespread frost damage leading food shortages in 1941, 1972, and 1980 the 1997/98 frost has been the greatest frost in the recorded history of Papua New Guinea. It affected more than 200,000 people.

### 3. Fires

Associated with the droughts is deliberate lighting of Grassland fires mainly over the southern region (Papuan Coasts).

Over the course of the 1997/98 drought this tended to be expanded even to the highlands region implying the increase risk posed to wildlife species and the increased smoke haze levels detrimental to aviation.

Although no comprehensive evidence of increased intensity of Bush and grassland fires numerous expression of concern of lighting of fires was popular over the drought period.

### 4. Smoke haze

Papua New Guinea has some to hundred registered aircraft serving some 500 aerodromes. The increased smoke haze levels over the course of the 1997/98 drought

severely affected civil and military operations especially those engaged for drought relief operations. A closer investigative look has effectively shown that the smoke and haze levels in the PNG airspace were in fact abnormally intensive.

5. Health hazards ( Eye irritations, Lung infections & Cholera)

Although no comprehensive statistical data is available to support this especially in view of the lack of such statistics taking capability in Papua New Guinea, There existed a real risk of increased smoke and haze related infectious diseases over the course of the drought.

6. Floods.

Papua New Guinea has some of the biggest rivers within the Oceania region. These include the Fly, the Sepik, Purari and the Markham rivers among others. Although almost all are traditionally important for subsistence fishing the Fly and the Sepik are by far the most important economically. The Fly is used as a transportation medium for copper and Gold from OK Tedi mine to the coast. Its climatic significance is due to its non-respect of either the warm or cool phase of El Nino and Lanina. Both the Warm phase and the Cool phase are associated with drought and flooding respectively.

7. Landslides

As a mountainous country Papua New Guinea is very much prone to Land slides. As a general rule the wet season for respective areas provided they are mountainous, is associated with some form of landslide. The Abnormal wet seasons, as a result of Lanina is very favourable for Land slides. Mainly over the highlands region and the Morobe Province.

8. Tropical Cyclones

Papua New Guinea lies outside of the main cyclone belt region, which is further east or south, or southeast of Papua New Guinea. Most of the cyclones form outside the PNG area of responsibility and track into SE Papua New Guinea. Over the years, the most favourable region for cyclo-genesis has been the Gulf of carpentaria over Northern Australia which lies within the Darwin Tropical Cyclone warning responsibility and just southeast of PNG that lies within Brisbane or Nadi areas of responsibility.

### THE 1997-98 Elñino Event.

The presence of the drought in Papua New Guinea was first evidently recognized in August 1997 when Frost was occurring over the drought in Enga, Southern Highlands and Western Highlands provinces. The PNG weather Office was consequently notified in a form of a Facsimile message from the then Director of the National Disaster and Emergency services, Sir Leith Anderson on August the 6<sup>th</sup>, 1997. The Facsimile message requested advise on the Elniño phenomenon requesting the information on the extent of the drought and obviously how long it was going to take. He further mentioned drought conditions of an alarming nature in the highlands as informed by villagers of the region. Upon receipt of relevant Feedback from the Weather Authorities and other Scientific organizations, the Government moved in an attempt to contain the situation.

Initially, National Government moved to establish a National Drought Relief Committee under the Chairmanship of Hon. Peti Lafanama MP to oversee the drought proble and provide political direction and support and necessary policy initiatives. Simultaneously, the National Disaster Committee moved immediately to set up a National Working Group with the immediate task of organizing world-wide expertise to assist National Technical Experts in the establishment of an assessment system to advise on and monitor the full nature and extent of the drought and frost.

The working group was also charged with the task of liaising with all donors, NGOs and Government departments so as to develop a multi-sectoral action plan which has been the focus for the National Disaster Committees planning and implementation of relief and rehabilitation activities. The National Disaster & Emergency Services was from the beginning of the drought, the operational arm of Government efforts and as well acted as the centre to promote liaison with provincial authorities so as to encourage their participation in delivering of relief assistance in the affected rural areas.

The impacts of drought nationwide prompted all levels of the communities to respond from political level to grassroots level. The National Government took the disaster as its priority and major policy statement was presented to the parliament in March 1998 by the then Minister for DPPLGA, Hon. Simon Kaumi MP on the Elniño phenomenon, its impacts and actions taken by the Government to assist the people. The massive National Government's Food distribution programme were based on the results of the in depth assessment which found that almost 700,000 people across the nation that were affected by the drought.

A further 60,000 people located in areas in accessible by road were supplied relief food supplies by aircraft of the Australian Defence with funding through AusAid. PNGDF worked with their Australian counterparts in this exercise.

Based on the assessment results, the National Governments total food requirements to feed 650,000 affected by drought per month was calculated at about 5000 tonnes of rice, 1200 tonnes of floor and 65000 litres of cooking oil.

The assessment result had also served the purpose of classifying affected areas into 5 categories of severity. Categories 4 & 5 were classified as severely affected areas with no food in gardens and experiencing extreme situation, famine food only being eaten and water in short supply and possibly polluted, and people ill and small children and old people seriously sick.

The then Minister for Provincial & local Government affairs, Hon. Simon Kaumi MP when delivering the major policy statement on drought, state that drought and famine were not new to the people of Papua New Guinea. While scientific records can take the country back to the beginning of the century, the traditional coping mechanisms and alliances flow back into the beginning of time. The strength and vitality of the peoples cultures and traditions have been the greatest asset in overcoming the effects of the drought. The people's knowledge of traditional bush foods, ability to withstand pain and hunger and willingness to help in time of need have been the people's strength and their savings.

### **Response of the PNG National Weather Service.**

Upon request from the NDES and especially in absence of internet, advise was consequently sought from Darwin via Facsimile and arrangements for weekly climate advises were subsequently made.

For more informed details on prevailing updates similar arrangements were made with the Department of Mining for access to their internet facilities.

The Coverage of the 1997/98 Elniño episode was three fold.

- Firstly the media had their own connections either through the internet and through their own media network.
- Locally, monthly outlooks were being issued by the PNG NATIONAL WEATHER SERVICE These were mainly in the form of theoretical forecasts from the internet, the Darwin weekly advise supplemented by country wide observations of rainfall records deficiencies.

- Arrangements were also made for live sessions on the drought, the frost and haze towards the end of the year. The local TV station (EMTV) arranged for live interviews to discuss Elniño especially explanations of the causes, the impacts and the outlooks which were done in consultation with various Climate prediction centres via the Net.

Although media reports were numerous, the sources of comparison were mainly from WMO and perhaps from other climate prediction centres media releases. Locally it is presumed that the lack of sensitivity of previous episodes to the economy may have been the major reason for no comparisons. There was very little or no mention of Elniño previously although there may have been in 1982/83.

#### Level of Meteorological Research at onset of 1997/98 Drought.

At the onset of the 1997 Elniño, there existed an infant Climate Branch. The Branch role involved:

- data storage using Clicom (Climate Computing) a data management system setup with the assistance of WMO.
- Due to the obvious lack of information technology and appropriate expertise, most of the climate data is simply stored in clicom (Climate Computing Setup).
- Although there exists the potential for research in forecasting techniques and perhaps investigation of Climate trends, at the time of the drought there wasn't any comprehensive research being undertaken.
- providing climatic advise to the Government machinery; any services provided were solely in the form of normal climate data with no emphasis on the significance of long term climate monitoring and forecasting.

In absence of appropriate communication facilities like internet, the main activity of the Branch was predominantly data archival and raw data processing for clients which mainly consisted of infrastructure construction engineers and foreign researchers.

It is reasonable to suggest that very little or no scientific research was being conducted in relation to Elniño.

#### **Elniño Teleconnections.**

Papua New Guinea lies at the heart of convergence point (the southwest Pacific) of two important weather systems namely the Asian- Australian Monsoon system and the ENSO system. As a result Papua New Guinea and the Gulf of Carpentaria of Northern Australia are theoretically expected to be the worst affected regardless of both the warm and cool phases of ENSO.

In particular it is expected that during the warm phase, the eastward shift of the major convective area will result in severe drought conditions over mainly Indonesia and Papua New Guinea with the effect gradually fading eastward. Conversely, Papua New Guinea is expected to experience the worst flooding during the cool phase.

The Climate related anomalies in the country of the 1982-83 event are probably varied. The actual rainfall anomalies consistently suggest that the drought impacts of the 82/83 event were probably worst. The impacts however of the 97/98 event far outweigh those of the 82/83 event. This may be attributed to the obvious increase in economic activity and hence the sensitivity of the PNG economy to Climate including Climate Variability over the last 15 years.

### Climate-Related Physical & Social impacts of the 1997/98 El Niño episode.

Besides those mentioned due to various El Niño induced hazards, there were significant impacts in the following areas:

- Shortfall in Mining receipts especially due to drying up of the Fly river temporary shipping of concentrate from July to December 1997.
- Loss of production in most cash crops including Coffee, Cocoa , Copra and Rubber
- Extensive migration from Highlands region to coastal areas in search of Food.
- Power and water rationing was one of the major impacts in Port Moresby where the city's water and electricity generation reservoir recorded its lowest levels since the construction of the dam. This was consequently followed by increases in water and Power tariffs in early 1998.

### Publicity and Impacts Reports .

- Delayed reports or statements were issued in response to WMO press release statement of August 29<sup>th</sup> 1997.
- Various Reports were issued by different government departments and non-governmental organizations including the UNDP and Oxfam among others.

### POTENTIAL BENEFITS OF EARLY FORECASTING/WARNING.

- Information flow to most affected rural areas could have been received within reasonable time frame and appropriate mitigation measures could have been taken including the storage of relief supplies.
- Possibly insurance possibilities could have been considered.

### STRENGTHS AND WEAKNESSES of GOVERNMENT SYSTEM 's RESPONSE TO CLIMATE ANOMALIES.

#### STRENGTHS:

- A very close co-ordinative relationship between the National Disaster Management office and the National Weather Service which didn't exist prior to the disastrous event currently exists. During the course of the drought also saw the establishment of various sub-committees of the National Disaster

Committee, all to ensure effective monitoring, plan appropriate short to medium term mitigation options with the view to reduce impacts of future similar events. Among the notable were the National Water Sub-committee and the National Disaster awareness and preparedness committee.

- Improved Good collaborative, cooperative relationship between other relevant lead agencies and the non Governmental Organizations has begun to exist as a result of the drought

#### WEAKNESSES:

- Complacency,
- Financial constraints complicated by rough terrain.
- Non- self reliance and non preparedness in view of these potential disaster.
- Wrong attitude towards Natural Disasters with very little emphasis on impact reduction.

#### EXISTING POTENTIAL OBSTACLES.

- Financial constraints could still become real obstacles against effective preparedness but the impacts could still be reduced. Warnings could not have been heeded based on the credibility of past forecasts or due to simple complacency.

#### **Lessons Learnt.**

Many lessons have been learnt from recent major disasters in PNG including the 1997/98 ENSO episode. These lessons have been incorporated into the National Disaster Preparedness and Mitigation plans.

- So far substantial amounts of money have been spent on rural water supply projects installing water supply systems in areas designated category 4 & 5.
- An agricultural project, looking particularly at food security is currently in its initial stages within the department of Agriculture and Livestock. (DAL)
- Among the most relevant responses to the event so far as the weather and climate forecasting services was the financial assistance by the National Disaster Management office to the Climate Branch of the PNG National Weather Service for the improvement of its Information technology and data processing capability.
- Amendments are currently being done to the National Disaster Plan of 1987 with the assistance of Emergency management Australia (EMA) to make it more proactive rather than reactive as it was prior to the 1997/98 event.

The increased level of sensitivity to climate as a result of the 1997/98 event meant funding assistance to the Climate services branch of the PNG National weather Service lead to the timely forecast of the expected Lanina event. The Director of NDES was briefed on the potential of increased flooding especially over the Southern Papuan Coasts and to a lesser extent on chances of landslides from November 1998 and acted within reasonable time frame to warn residents of potentially risk areas.

**As a result there were no complaints in the MEDIA for the first time.**