From:	NSW Government
To:	Flood Inquiry
Subject:	Floods Inquiry
Date:	Wednesday, 8 June 2022 9:39:41 AM
Attachments:	How Trees Reduce drought & Flood.docx

Your details

Title	Mr
First name	Bryan
Last name	Boulton
Email	
Postcode	4215

Submission details

I am making this submission as	A resident in a flood-affected area
Submission type	I am making a personal submission
Consent to make submission public	I give my consent for this submission to be made public

Share your experience or tell your story

Your story	My wife was born and bred in Lismore and well acquainted with many floods. Difference is that climate change, man made disasters and other natural cyclical influences have annihilated the 100 year flood prediction. Also the flood heights are but a warning of more devastation to follow the 2 floods in a month record. Traditional

	measures to deal with floods did not and will not be effective. Currently we own a house in Riverside Drive Ballina across the road from the Richmond river. (We also do have flood insurance) Quick thinking from the tenant (roof plumber) using a water proof buffer around the front & sides with strategic sandbagging stopped the flood water inundating the house. Ours was the ONLY house NOT inundated in the street! The original builder (1970's) sensibly set back the house slab and with a steeper driveway than others in the street. I don't believe there are records which indicate when the area flooded to the recent level (inundation into houses). The land in the area was swampland originally and developed in the 50's ?? We were very lucky and can not imagine how catastrophic it is for people who lose everything in these floods - which are only going to more common AND more severe.

Terms of Reference (optional)

The Inquiry welcomes submissions that address the particular matters identified in its Terms of Reference

1.1 Causes and contributing factors	Lismore basin should never have been allowed to be developed. Easy to say in hindsight but the truth. Now the ball is in the hands of Government (State & Federal) to meet the challenge to save lives & property from future disasters (which are inevitable).
1.5 Recovery from floods	I submit that the Lismore basin & other flood prone areas should be resumed in a joint State & Commonwealth Initiative. The area may be forested with drought/food resistant trees etc - creating jobs for the area. Needs to be trees like pine forests or similar which grow quickly and may be harvested and a planned sustainable income to fund the initiative.

This resuming of the affected land also requires relocating residential, rural & businesses to higher ground

In a relevant response to drought & flood - trees are being used world wide. In the Rally For Rivers response (India) Mr Simon Dixon, from the University of Birmingham, said: “We believe that tree planting can make a big contribution to reducing flood risk, and should be part of a wider flood risk management approach, including conventional flood defences. Tree planting would represent an extra element that helps to slow down the arrival of rain water to vulnerable locations.”

The mechanism through which trees prevent floods is the same mechanism through which they mitigate droughts. When trees are planted water is absorbed by soil, and just as rainwater percolated downward into soil, water can percolate horizontally in soil as well. This kind of underground “water flow” can feed water into streams and rivers wherever the water table intersects the streambed.

Supporting documents or images

Attach files

- How Trees Reduce drought & Flood.docx

How Trees Reduce Flood & Droughts

RALLY FOR RIVERS

https://www.bing.com/ck/a?!&&p=5298c752b67865b71e55929131ad9d8e1c4eb92229cffc925b079f8c3b171b49JmltdHM9MTY1NDY0MjE4MSZpZ3VpZD1jMzgwN2Q5ZS1mOTI1LTQ3OWYtYTNiMC03MTkyMzcyZDE1MDMmaW5zaWQ9NTE2NQ&ptn=3&fclid=1db6f677-e6b4-11ec-8483-a35a5aa7312b&u=a1aHR0cHM6Ly9pc2hhLnNhZGhndXJ1Lm9yZy9yYWxseS1mb3Itcml2ZXJzL2hvdy10cmVlcy1yZWR1Y2UtZmxvb2QtZHJvdWdodHMv&ntb=1

Trees help rain seep into soil because living and decaying roots make soil porous by creating a network of well-connected, minuscule channels in the soil. Rainwater seeps into soil with such channels several hundred times faster than it seeps through soil without channels.

Additionally, when plant debris falls on the soil and starts to organically degrade, it helps soil maintain integrity and form small aggregated clumps. These clumps also ensure that soil is porous.

Thus, land under tree cover is more capable of absorbing rainwater. This reduces the volume of water flowing over the surface after a rain event, and thus reduces the volume of water entering rivers and streams. Computational models show that if reforesting is done in 20-35% of the river's catchment, a 10-15% reduction is seen in flood peak heights after 25 years of forest growth.

When trees are taken off, floods often increase because most of the rainwater enters streams and rivers in a very short timeframe. Such high intensity flow is often not usable by human beings and usually flows into the ocean, while also causing soil erosion which leads to loss in soil nutrients. This is why large areas of formerly productive land, where annual rainfall is relatively high, have become desertified once tree cover is removed.

A study by IIT Roorkee compared the peak flood levels before and after vegetation has been removed due to urbanization. Conversion of woodland to low density residential uses gives a 11-30% reduction in groundwater recharge. Conversion of woodland to high density residential uses gives 52-100% reduction in groundwater recharge. Conversion of woodland to commercial uses gives 94-100% reduction in groundwater recharge.

However, tree-planting reduces these high intensity events and creates a more sustainable flow that is available even after rain ceases. It also limits soil erosion.

There are several examples worldwide of governments using tree planting to control floods. In England, the municipal authorities of Pickering in North Yorkshire have used tree planting to reduce flooding. This is in stark contrast to other areas where heavy rainfall caused devastating flooding. Their initiative is called "Slowing the Flow". An analysis of the scheme concludes that the measures reduced peak river flow by 15-20%. The scheme was set up in 2009 after the town had suffered four serious floods in 10 years, with the flooding in 2007 estimated to have caused about £7m of damage.

The work included planting 40,000 trees and the restoration of heather moorland, all intended to slow the flow of water into the river and reduce flood peaks. The project cost the

government £500,000. An analysis of the project calls for a more natural approach to flood risk management that followed a series of serious floods in recent years.

Simon Dixon, the study's lead author from the University of Birmingham, said: "We believe that tree planting can make a big contribution to reducing flood risk, and should be part of a wider flood risk management approach, including conventional flood defences. Tree planting would represent an extra element that helps to slow down the arrival of rain water to vulnerable locations."

In Pakistan, torrential rains and landslides during April 2016 in Pakistan resulted in the deaths of more than 140 people and destruction to material property. Deforestation and erosion of mountain slopes are said to have increased the level of destruction. According to environmentalists, "While climate change is causing the enhanced intensity of rainfall, deforestation is unfortunately abetting the mass scale damage".

After this experience, the Imran Khan-led Pakistan Tehreek-e-Insaf (PTI) party in north-western Khyber Pakhtunkhwa (KP) province began the "Green Growth Initiative". Under this initiative, the party aims to reverse sixty years of deforestation. A large scale afforestation project called "The Billion Tree Tsunami" is a key aspect.

Starting from June 2015, over 250 million saplings have been raised in largely private nurseries so far. The remaining 450 million saplings are being naturally generated in forest enclosures, which are being maintained by local communities. Such nurseries are present in almost every district of the area. Most are privately owned and the demand is increasing.

According to thirdpole, "Under the "youth nurseries" package, the provincial government provides a secure buyback agreement for unemployed youth or rural women to set up kitchen nurseries – with about 25,000 saplings – as well as a 25% of costs in advance. The nursery can then earn around PKR 12,000 to 15,000 (USD 115-143) per month, which is a sizeable income in the area. In fact, most of the small scale or household nurseries are currently being run by rural women who have managed to enhance their income."

The WWF is supporting the government in this endeavour. Imran Khan aslo launched the "One Tree, One Life" initiative, under which children are being inspired to take up tree planting and caring for trees.

Pakistan's federal government is also joining in with a "Green Pakistan Program", which aims to plant 100 million trees in five years.

Up until recently, stormwater management strategies have been focused on detaining large volumes of water in basins that had little to no effect on removing the pollutants in the stormwater. But that is changing. For example, in the US, municipal authorities are working to protect water quality and to put stormwater back into the ground where it fell. One of the ten principles for new stormwater management is "preserve and utilize natural systems (soil, vegetation, etc)".

The role of trees and forests in managing stormwater and protecting water quality is just beginning to be understood by some engineers, planners and community leaders. One of the most powerful statements that help support this came from the Chesapeake Bay Executive Council in 2006 and reads:

‘Forests are the most beneficial land use for protecting water quality, due to their ability to capture, filter, and retain water, as well as air pollution from the air. Forests are also essential to the provision of clean drinking water to over 10 million residents of the watershed and provide valuable ecological services and economic benefits including carbon sequestration, flood control, wildlife habitat, and forest products’.

Around the world, Agroforestry has been shown to be an effective means of river watershed management. Studies have been conducted in several places. Indonesia has had a program in place since the 1970s to regreen its watersheds, which are crucial for drinking water, irrigation and other activities that support many of the country’s poorest communities. Besides these ecological benefits, benefits to farmers also include higher crop yields, increased income, resilience to climate change, reduced dependence on natural forests, reduced pest incidence due to birds nesting in trees, and more biomass production.

The mechanism through which trees prevent floods is the same mechanism through which they mitigate droughts. When trees are planted water is absorbed by soil, and just as rainwater percolated downward into soil, water can percolate horizontally in soil as well. This kind of underground “water flow” can feed water into streams and rivers wherever the water table intersects the streambed.

This underground or base flow is what keeps most of India’s rivers flowing even in the dry season. It is hard to exactly calculate how much of a rivers water comes from this base flow component because most rivers are dammed these days, so figuring out how much water is actually entering the river has many variables. Estimates for peninsular rivers range between 20-40%. For the Narmada, it is about 20-22%. For the Godavari it is estimated at around 35%.

References

1. http://onlinelibrary.wiley.com/doi/10.1002/esp.3919/abstract
2. https://www.theguardian.com/environment/2016/apr/13/500000-tree-planting-project-helped-yorkshire-town-miss-winter-floods
3. https://www.thethirdpole.net/2016/05/11/pakistans-billion-tree-tsunami-takes-hold/