

ECONOMICS OF BUSHFIRES AND BUSHFIRE MANAGEMENT

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The Economic Project of Program C aims to assist bushfire management to achieve better economic outcomes. Bushfires affect commercial, environmental and social assets. Since resources are limited and we have unlimited desires, we have to make choices about use of resources. It will provide tools to assess the cost of bushfires and the cost effectiveness bushfire mitigation.

This Poster reports the work on two aspects of the project: the “North East Victoria Fire 2002/03” and Aerials sub project. Details of the whole economics project are given in the last year’s poster.

Effects of Bushfires on Timber Market: Economic Model

Figure 1 is a graphical representation of the timber market, showing a shift in supply and the glut of salvage of either saw-timber or pulp-wood stumpage offered to the market after fire event. Before the 2003 wildfires, equilibrium was at point *a*, the intersection of the supply curve based on the original available inventory, $S(I_0)$, and demand, D , establishing a price P_0 and a quantity of Q_0 . During the first period after the fires, the time of timber salvage, a glut of damaged material V , entered the pulp-wood and saw-timber markets. This material can be combined with the undamaged timber Q_U . The undamaged timber Q_U establishes a new supply curve, $S(I_1)$, however for the short-term, the time of timber salvage, there is a second short-term supply curve $S_T(I_1, V)$ which is the supply curve including the damaged material V and the undamaged inventory after the fires, I_1 , this new supply curve intersects with the demand curve at point *b*, establishing a short-term price of P_T at a quantity of Q_T . The salvage volume V , gradually shifts toward the price axis, meaning, its amount decreases, as the salvage material exhausts. After the salvage was exhausted, the new equilibrium, based on the new supply curve can be seen at point *c*, with a price of P_1 and a volume of Q_1 . Based on these methods, timber markets were likely to have experienced both a short-term price drop, due to the salvage glut and a long-term price rise, due to the reduction in timber inventories.

North East Victoria Fire on Timber Industry

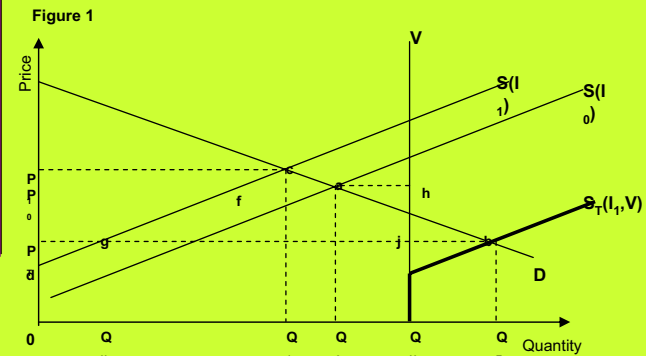
Sustainable annual cash-flow from timber industry **\$8,700,000.**

Income losses (discounted) from fire affected area over next 100 years at complete loss of timber value \$172,676,819. (Sustainable harvesting was calculated as the future net income from sustainable harvesting that could have been undertaken for the next 100 years, if the fires would not have killed the forest in that area)

Salvage value of timber effected from fire **\$70,000,000**

Total loss from fire = sustainable income loss – income from salvage timber
 = 172,676,819 – 70,000,000
 = 102,766,819 (\$102 million)

This is a total net loss of around \$100 million due to a loss of timber harvesting in an area of 7500 hectares for the next 100 years. (Forest replanting and concern on discounting for 100 year period are purposely ignored in the analysis)



Economic Welfare Effects

Short and long term welfare effects on timber producers and consumers can be calculated using the above model (Figure 1). The short-term welfare changes are as follows: timber consumers experience a positive consumer surplus = P_0abP_T ; whereas owners of undamaged timber experience a negative producer surplus of $-P_1cgP_T$. The long-term welfare changes are as follows. Timber consumers experience a negative consumer surplus of $-P_1caP_0$, and owners of undamaged timber experienced a positive producer surplus of P_1cP_0 . The owners of salvaged damaged timber suffered welfare changes of P_0hjP_T .

Benefits for Region

- Government recovery plan;
- **\$70.6 m** Insurance compensation payments **\$18,400**
- Bushfire environmental rehab. **\$548k**
- Ongoing assistance \$?
- Agriculture advisory services **\$200k**
- Weed control grants **\$300k**
- Key tourist road reparation **\$100k**
- Support of assessment of damaged bridges **\$80k**
- Direct assistance to tourism industry **\$1.9 m**
- Livestock assistance **\$500k**
- Fencing assistance **\$5.75m**
- Domestic assistance
- **up to \$28,800 per household,**
- Repairs of water tanks **\$900 per person**

Costs for Region

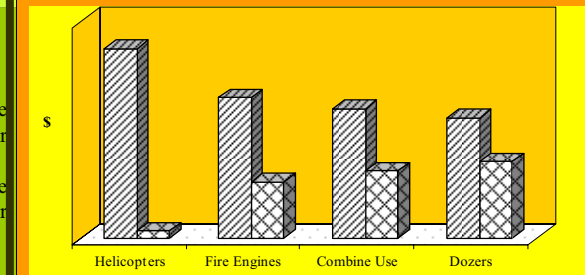
- **108,393** hectares of private land (including farms and **2,500** hectares of plantations)
- **659** properties affected
- **3000 km** of fences
- **13,000** head of livestock
- Large loss in tourism, (over 2 million tourists visit this area each year contributing around **\$100million** to local economy)
- **110** grazing areas were affected
- **50** historic huts burnt down

Economic Analysis of Aerial Fire Suppression (with Program A) (Figure 2)

Fire spread model	Estimates
• Linear fire font	– Area burned (actual damage)
• Uniform rate of spread	– Area protected
• Homogeneous fuel bed	– Time taken to contain fire

Cost plus loss and net benefit estimates for alternative fire suppression approaches with 10 min response time for Helicopters and 60 min response time for other resources (for hypothetical fire suppression scenario and operational cost)

Figure 2



Net Value Change (NVC) of 2003 wildfires in Victoria

Impacts of wildfires can be beneficial as well as detrimental, this is the reason why Net Value Change (NVC) in this context is appropriate, it describes the fire induced costs minus the fire induced benefits as well as incorporating suppression and pre-suppression costs.

Losses:
 Losses of Forest Timber: - \$102,776,819.23
 Non-Timber Losses : - \$ 82,600,000.00
 Total Loss : - **\$185,376,819.23**

Total benefits : + **\$1,137,236.03**

Losses - Benefits = NVC
 - \$185,376,819.23 + \$1,137,236.03 = - **\$184,239,583.2**

Alternative cost method is used in the analysis since estimating the cost and benefits of wildfire since benefits particularly the ecological benefits, is a daunting if not impossible task