ABSTRACT

HALIMATUS SA’DIYAH. Economic Analysis of Water Allocation Among Competing Users and Regions in Lombok Island: The Application of Dynamic Optimization Model (YUSMAN SYAUKat as Chairman, BONAR M. SINAGA and TAHLM SUDARYANTO as Members of the Advisory Committee).

Water scarcity has been an increasing concern among countries. It is estimated that the World would face critical water scarcity by the year of 2025. Water Demand of Lombok has tremendously increased by 10 times during the last decade, while its supply tends to gradually deteriorate over time, leading to intense competition and conflict among users. This research was aimed to address the issues of efficient and fair water allocation among competing production sectors and regions, and specifically to:

1. estimate water demand and supply functions,
2. develop an existing optimal water allocation model,
3. simulate the effect of food self-sufficiency and aggregate pumping quota policies under different discount rate and economic growth scenarios on the water allocation, groundwater remaining stock and the value of net social benefit, and
4. determine the economic value of water among sectors.

The objective of the optimization model was to maximize the net present value of social benefits generated by all production sectors and consumers (households) under some hydrologic and socio-economic constraints. Dynamic Non Linear Programming was employed to determine the optimum level of water allocation, and General Algebraic Modeling System (GAMS) was used to solve the problems. The Results indicate that bottled water demand is considered the most price elastic among other water demands, while all of virtual water demands, except for tofu, are also considered price elastic. Water allocation/consumption varies among policy, discount rate and economic growth scenarios, and tends to gradually decrease overtime for all sectors. The value of social benefit also differs among policy scenarios, reaches up to Rp.10.81 trillion for 16 years time horizon. Agriculture consumes the highest level of surface water, reaches up to 54%, while tourism sector consumes about 18%, and the rest was consumed by domestic user and industry. Tourism sector consumes the highest level of groundwater (72%). Under food self-sufficiency policy, groundwater remaining stock is the least among other policy scenarios, and will be exhausted by the year of 2017, while aggregate pumping quota could maintain sustainable groundwater stock overtime. Marginal user cost of water under Food Self Sufficiency Policy is the greatest among others.

Keywords: Efficient, Dynamic, Water Allocation