

RESOURCE CONSERVATION AND WOMAN EMPOWERMENT

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Mangrove plant, or *bakau* as it is known in Indonesia, is one of the vegetations commonly found along the shallow coasts, estuaries, deltas and protected coastal areas and are still influenced by rising tides. After the Aceh tsunami disaster, mangrove restoration was intensively conducted in coastal areas all over Indonesia and was made into a special conservation program by the government. The mangrove ecosystem cannot inhibit the tsunami event but the mangrove ecosystem can reduce the negative impact of the tsunami event

Mangrove is distinguishable by its big, wooden stilt roots, sharpening tip in the form of supporting leaves. The root of the mangrove tree are morphologically distinguishable into heart root which grows into the ground and the stilt root which appear to grabs onto the surface of the ground. Mangrove forests serve several important ecological roles: they act as filters which turns saline water into fresh

water, buffer from seawater intrusion, prevention measures against erosion and abrasion, holder of sediments to form new habitats, feeding ground, nursery ground, and spawning ground for a number of aquatic wildlife. Mangrove forest also possess economical functions such as as source of income, industrial ingredients for the locals and as source of new mangrove seedlings.

Mangunhardjo Village, Mangkang area, Tugu district of Semarang city is an area dotted with brackish water pond. However, the area has been suffering from the effects of climate change, being inundated by overflow of river and seawater intrusion (*rob*). These disasters cause decline in the productivity of the ponds in the area. Therefore, in an effort to combat the adverse effect of environmental change in the area, the locals of Mangunhardjo villahe decided to shift their

livelihood by restoring the surrounding mangrove forest. Mangrove conservation is one of the Sub-Education programs of Woman International Club Semarang, with its purpose dubbed *save our generation*. WIC Semarang together with assiting partner from Universitas Diponegoro Semarang had performed their program by providing solutions for mangrove conservation for the locals. Among the activities of the program were mangrove planting, mangrove-based food production, and mangrove waste management by applications of bioactivator bacteria for mangrove composting and production of mangrove-based natural dye for batik fabric.

Mangrove Planting

As a result of reduced productivity of the Mangunhardjo's brackish water fishpond, Mangkang, District of Tugu Semarang, the locals rehabilitate the land by planting mangrove. The activity is carried by most of the families, men and women. A mangrove ecosystem is now formed in the area of urban village of Mangunhardjo. There are locals working on the mangrove who required special assistance to improve

their living and welfare by mangrove conservation.

Food made of mangrove

Mangrove fruit can be processed as food, such as crackers, syrup, brownies, *klepon*, sticks and many others. The 3 species of mangrove that can be processed namely: lindur (*Bruquiera gymnorrhiza*), api-api (*Avecenia* sp), pidada (*Sonneratia* sp). Lindur (*Rizhophora* sp) contains quite high energy and carbohydrates, more than the carbohydrates contained in rice. Mangrove fruit contains tannin which gives it a bitter taste. Usually, the locals boil or soak the mangrove fruit overnight to reduce the tannin. Soaking and boiling mangrove fruit could take away 40% of tannin. In addition, the mangrove fruits are also treated with flour for preservation. The flour treatment process breaks the fruit's metabolism chain, prolonging its shelf life, due to the lower water content which gives it more flexibility to be used in various types of processed food. Food made of mangrove marketed by women of rural fishing community in Mangunhardjo are: crackers, syrup, sticks, *klepon*, and cake.

Application of mangrove bacteria bioactivator for compost.

The microorganisms associated with mangrove waste has been proven to synthesize secondary metabolites similar to the host plant, which makes them a potential source in exploration for new compounds. The symbionts bacteria of mangrove waste are colonies of bacteria growing, developing and are associated with the waste of mangrove. Bacteria associated with the microbes also contribute in the nutrition cycle of their host plant and decomposition of waste. The compounds produced by potential microbial symbionts are used as precursor for biosynthetic metabolism from pathogen and other predators (*Taylor et al., 2007*). Isolated microbials producing bioactive compounds has been noted to have more activities compared to that of the host plant (Krinsky, 2005). It has been found that symbiont bacteria are potential as bioactivator (Pringgenies *et al*, 2015). Bioactivator is applied by the community of Tembalang urban village in turning organic waste into compost.

Mangrove waste utilization in natural dye for batik fabric.

Fashion mode cycle recently develop rapidly that it requires designers and academics working in the line of fashion to continue with the creative, innovative and marketable designs. Many fashion products, particularly batik, utilize the synthetic dye containing chemical material in its production. The advantages of the synthetic dyes are better availability, guaranteed availability of color, wider range of color options, and more practical. However, the utilization of synthetic dye could jeopardize human health and environment due to the strong carcinogenetic content causing the skin allergic, discomfort and pollution. As an alternative of synthetic dyes in fashion especially batik production, natural dyes are utilized. Fashion or batik designs incorporating natural dyes have the high economical value deriving from their artistry, distinctive colors and environment orientation, giving out impressions of exotic ethnicity and exclusiveness.

Woman International Club Semarang with assisting partner from Diponegoro University Semarang has been promoting the application of mangrove-based natural dye in 'batik made of mangrove waste' among the women in the

fishing community of urban Mangunhardjo village, Semarang. Mangrove waste dye are made of twigs waste, leaves and damaged mangrove seedling (Pringgenies *et al*, 2012). With high spirit and desire to increase revenue, the women of fishing community around the coastal area has produced batik materials with natural dyes from mangrove waste (Pringgenies *et al*, 2016). The community is enthusiastic to develop their industry through the utilization of mangrove waste in their batik products, that the community is now touted as a special industry group of batik craftsmen named: "Wijaya Kesuma" Batik Group. However, this group needs assistance to continue raising the quality of the products.

Based on the narrative, the main target achieved by all the activities conducted by Woman International Club along with the Diponegoro University team is to turn District of Tugu Semarang into an industrial zone utilizing waste of the mangrove in compliance with the zero waste principles and achieves the blue economy tier through empowerment of the women in coastal fishing community and also creates mangrove conservation zone

for better environment for future generation.

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