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Conservation of Rare Species toward Enhancing Food Security

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INTRODUCTION

Rare species is defined as a group of organisms that include fruits, animals, or plants that is very uncommon to general public. It is also considered as endangered or threatened species. This rare species can be an alternative food sources, but its sustainability would be at stake if no proper conservation measures are taken by the authorities. Conservation's primary focus is to maintain the health of the natural world that include fisheries, habitats, and biological diversity. Besides enhancing the flora and fauna, the conservation steps will favorably affect the food security goals, save up and diversify food sources. Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life (FAO). In this modern era, most of the economic sectors have begun to improve their production by enhanced technologies, knowledge and skills.

In today's era, varieties of foods have gained consumers' attention and acceptance from all over the world. People's creativity on making new kind of meal will never end. From a hobby, they can make a business with the ability to make foods that can entice consumers' purchase and consumption. Due to economic development, competition for land resource has become more vigorous resulting in depleting bio-diversity, which has affected availability of rare food crops, animals and fishes. The population growth will undoubtedly increase demand for food in the future, hence more food needs to be produced. On the other hand, agriculture factors are depleting. Thus, rare species could be one of the alternatives to increase food supply. The future of forest which are housing of rare species of food items needs to be protected to conserve them, which subsequently play important roles in food security goals. The purpose of this paper is to highlight the importance of conserving rare species that can be the future food source and the challenges that need to be managed by the authorities in order to ensure these species are secured.

Rare Species in Malaysia

Currently there is a lack of a consensus definition for neglected and rare species. There is even a lack of consensus on what these species should be referred to as with different names referred to

by different names e.g., orphan species, neglected species, underutilized species, forgotten species and minor species. In general, rare species is determined by a low number of organism in a region such as in Malaysia. In general, rare species can be classified into three clusters that include animal, fruits and vegetables. In spite of the diminishing area of forest due to large scale land clearance, widespread logging, tin-mining and quarrying of limestone and the 'development' of mountain resorts, and pressure on individual species from commercial plant collecting, very few species are certainly extinct. In the case of crops, the percentage of endangered species ranges from 10% (palms) to 14% (trees). Particularly vulnerable are rare species confined to a single locality, such as 70% of Didymocarpus species. Endemism among tree species averages 30%, while for herbaceous groups it may be as high as 90% (Begonia).Table 1 shows some types of rare species in the clusters of livestock, fruits and vegetables.

Table 1. Types of rare species in the clusters of livestock, fruits and vegetables.

	Animal	**Fruit**	**Vegetable**
species	Bluefin tuna (*Thunnus thynnus*)	Tarap (*ertocarpus odoratissairmus*)	Kerdas (*Archidendron bubalinum*)
	Gaur (*Bos gaurus)*	Rambutan (*Nephelium lappaceum)*	Cemperai (*Champeria griffithii*)
	Fin shark (*Selachimorpha*)	Sentol (*sandoricum koetjape (burm.) merill)*	Maman (*Gynandropsis gynandra*)
	Fin whales (*Balaenoptera physalus)*	Mesta (*nephelium sp.)*	Terung asam (*Solanum lasiocarpum*)
	Yellow-breasted buntings (*Emberiza aureola)*	Dabai (*canarium odontophyllum*)	Terung pipit (*Solanum torvum*)

Conservation practices in Malaysia

Conservation is the preservation or efficient use of resources or the conservation of various quantities under physical laws. In simple words, conservation helps to prevent these species from extinction. This is important to secure food source and preserved these species. If conservation step is not being taken seriously, those particular species would probably have high chance to extinct, thus our food source will also be affected. The future generation can experience and see those rare species with their own eyes. With the presence of rare species, there will be no issue regarding accessibility for food intake or any other particular used. The stability of the food security is in a good condition as there is no problem with food availability and food intake, thus there will no problem with the utilization of the sources. Conservation those rare species will benefit the current and future generations. Through conservation, the availability of the food can be secured.

There are several organizations that championing rare species conservation and one of them is World Wildlife Fund (WWF). However, the main function of this organization is to save wildlife, (can also be considered as rare species or endangered species). Although their main function is to conserve the wild life, WWF also collaborated with other organizations for sharing knowledge and expertise in terms of preserving other commodities. The collaboration also includes lobbying the government for a better policy, creating awareness campaigns and information dissemination.

The Malaysian Agricultural Research and Development Institute (MARDI) has been playing a significant role in conserving agricultural endangered species. MARDI is one of the institutions that take the responsibility to conserve the endangered and rare crops. MARDI has the largest plant genetic resources collection for food and agriculture in the country. MARDI was appointed as the National Agro Gen Bank through its MyGeneBank since 2011. Its role is to determine the future direction of the country's genetic resources management (Shukri, 2016).

The Malaysian government established Crops for the Future, an organization in which its functions are to secure underutilized crops in global agriculture, especially in developing regions of the world. This organization carry out research to provide trusted knowledge on underutilized crops. It aims to deliver innovative and useful products from underutilized crops. The cultivation of underutilized crop species and their incorporation into the diets of humans and livestock have a number of potential benefits, including:

- Improved food security by reducing our dependency on only major crops for food and non-food uses
- Providing a greater range of options to address climate change
- Optimizing land resources by cultivating soils that are marginal or unsuitable for the world's major crops
- Promoting access to better nutrition for communities, particularly in the developing regions of the world
- Diversifying income generating opportunities for small and medium-scale farmers

Malaysia has recently published its national strategy for plant conservation, which now forms the basis of conservation activities for the country. Since 2004, Malaysia has been running a project entitled "Conservation Monitoring of Rare and Threatened Plants of Peninsular Malaysia", in which conservation status assessment is scored for a number of families. Results of the assessment of 458 taxa included 46.1% in some threat category. Detailed conservation studies are in progress for 33 species of threatened plants. Initial work on these species include spatial distribution studies at regional level based on herbarium records, and at a more local level, population studies to determine demography of populations.

Issues and Challenges

There are several issues and challenges faced by the Malaysian government in undertaking conservation of rare species:

a. Population Growth Effects on Food Insecurity

Rapid growth of human population increases the demand for resources, and that will cause an increase in exploitation of resources at the maximum level beyond the capacity of the available resources (Kideghesho et. al., 2013). Population growth and increased in demand are the major issue that could cause the food crisis. The increase in population will surely increase the demand and the usage of resources, particularly food. The resources need to be monitored to prevent of extinction and ensure food security**.** Currently, the Malaysia's population is around 30.8 million, and is projected to increase to 34.5 million by 2020. Malaysia was ranked the top ten countries with a higher score is the Global Food Security Index in Asia-pacific region. This score indicates a better value

in terms of affordability, availability, quality and safety of the food security, that make Malaysia placed number six out of ten countries in the Asia pacific. Even though the food is currently secured, Malaysia needs to strategies its future supply of food as more than 30% of food is imported from overseas.

b. Climate change

Climate change or global warming can be defined as a rise in average surface temperature on earth, mostly due to burning of fossil fuels. Rising sea levels due to the melting of the polar ice (caused by climate change) contribute to greater storm damage (Brown, 2013). The warming of ocean temperatures could lead to stronger and more frequent storms, additional rainfall leads to flooding and other damages, and this will cause increases of wildfires on endangered habitats, homes, and lives which will contribute to scarcity of resources and death for every living thing. Climate change troubled the living organism, including human. The way they lived will be different, and there will be damage to their habitats, which will affect their population. All these issues are caused by human's action, unless burning of fossil fuel can be control, otherwise this problem will not solve, and it may become worse than how it was. In addition, changes in temperature and rainfall associated with continued emissions of greenhouse gases will bring changes in land suitability and crop yields (Schmidhuber and Tubiello, 2007).

c. Wildfires

Uncontrolled hunting for wildlife is the main reason in decreases of the population of rare species. In United States of America, 90% of wildfires were started by human (Rinkesh, 2015). Some were started by cigarette where some irresponsible individual simply threw their cigarette after smoking, intentional act of burning someone opens a new area for housing. The development of forest area for agricultural activities is another reason for burning. People cut down and burn trees, and it indirectly becomes the act of arson.

d. Rising income

Increase in income will increase consumer demand for goods and services, including food; and this will affect the quantity of food available in the market. As a result, the food price is slowly increased in time. Consumer spending on food from emerging and developing economies including Malaysia rose by 4.6% annually in real terms over the 2007-2012, compared to the average global increase of 2.8% yearly during the same period. Demand for food is far behind supplies, and leading to food shortages in most of the countries, and it also affects a rise in food prices. With no foreseeable integrated solution available to increase global food production, most of the analysts believe that low food supplies might become the new tradition (Euromonitor, 2013).

Initiatives to conserve rare species as source of food

There are several initiatives introduced by the Malaysian Authorities to conserve rare species as new source of food as follows:

1. Encourage farmers to carry out intra-crop diversity of traditional rare species with commercial fruits.

2. Encourage farmers to cultivate rare fruits and vegetables or herbs on commercial basis.
3. While conservation of genetic resources is important for the sustainability of rare species, breeding efforts are needed so as to improve the competitiveness of the different crop species and to make them adaptable to different climates
4. Develop value chains of different rare species from the input side and the marketing of the produce. Value chains for rare species need to be developed so as to make them commercial products that can be traded not only on the local market, but also internationally. This means that there is a need to promote the utilization of rare species, coupled with value addition of the harvested crops.
5. Consequently, sustainability of rare species requires concerted efforts to improve utilization of the produce coupled with conservation of the genetic resource base, its genetic improvement and value chain development.
6. Domestication of wild-species progenitor gene pool is represented among crop varieties and livestock breeds. Unexploited genetic material from landraces, rare breeds, and wild relatives will be important in allowing breeders to respond to new challenges
7. The introduction of crop diversity conservation is to protect as much of the genetic diversity of crops and their wild relatives as possible. This is in the expectation that some of this genetic diversity will be of value in future breeding programs.
8. In situ conservation of crop wild relatives (CWR) involves ensuring their survival in semi-natural ecosystems in which they occur. The main approaches identified for in situ conservation of crop genetic diversity are:
    - Genetic reserves – setting up reserves or more often modifying the conservation objectives and management of existing reserves specifically for the purpose of conserving crop wild relatives. This approach is especially suited for conservation of non-weedy CWR and likely to be a particularly efficient option where protected areas have been established to conserve other aspects of biodiversity and so the additional resource requirements to conserve CWR may be minimal.
    - On-farm management – that is the maintenance of traditional farming practices, or potentially modifying the practices of modern agriculture to protect crop genetic diversity, as through agri-environment schemes. This approach in some form or other is required for conservation.

CONCLUSION

Conservation of rare species is very important intervention for a better future. Conservation is not just to secure the food supply. It also has other benefits such as to save species from extinction, sustain food chained for the wild and save the environment from pollution. There are much non-governmental organization (NGO) and governmental organization that helped in conserving the endangered species with variety of approaches with the same objectives. The humankinds are supposed to play their role on supporting these activities to show that people care about environment, care about other living things, and care about how the future would be in a few decades. In other words, population growth won't be a serious problem if the conservation is conducted efficiently. Increase in a number of human would not affect the quantity of food consumed as the food source is conserved and stored for future used or for any emergency occurred. The sources then will be rationed from time to time. This process is

necessary to maintain our food supply for many years ahead as our resources keep on decreasing.

Activities such as planting trees, cleaning the drainage system, and manage the forest with care can lighten the effect of climate change. Cutting down trees would not help in conservation process, and it can lead to increase in temperature, that caused the climate change to become unstable, causing the rare species being close to extinction. From this situation, we can see that wildfires would play a major role on destroying our food security as it related with many other things. The rules and policy for illegal hunting (wildfires) need to be firm. Furthermore, the used of farmland have changed its purposes. The right management of conservation can provide a practical alternative in collecting rare varieties to be fully utilized in addition to help and complement the collection of food source. Besides that, conservation of rare species also could ensure that our future generations will continue to be able to learn about it and exploit the benefits to be used in a long run.

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