

## ENVIRONMENTAL AND ECOSYSTEM DAMAGE

*[Kerusakan Lingkungan dan Ekosistem]*

Al Faizah Imanina Yunas<sup>1</sup>, \*Sri Marlina<sup>2</sup>, Iswandi Umar<sup>3</sup>, Erianjoni<sup>3</sup>

<sup>1</sup>PKB Kabupaten Sijunjung, BKKBN PProvinsi Sumatera Barat

<sup>2</sup>Magister Student of Geography Education, FIS-Padang State University, Indonesia

<sup>3</sup>Magister of Geography Education, Faculty Of Sosial Science-Padang State University, Indonesia

\*Corresponding Author: srimarlina1978@yahoo.com

### **Abstrak**

*Kerusakan lingkungan adalah kerusakan lingkungan dengan hilangnya sumber daya air, udara, dan tanah; kerusakan ekosistem dan kepunahan fauna liar. Penyebab kerusakan lingkungan secara umum dapat dikategorikan menjadi dua faktor yaitu akibat kejadian alam dan ulah manusia. Alam sangat penting untuk kelangsungan hidup manusia. Peran yang diberikan oleh alam tidak lepas dari jasa alam itu sendiri yang dikenal dengan jasa ekosistem. Kerusakan yang terjadi pada berbagai ekosistem, menyebabkan komponen-komponen yang membentuk suatu ekosistem seperti keanekaragaman varietas, keanekaragaman jenis juga terganggu. Akibat degradasi ekosistem yang telah terjadi, terdapat minimnya layanan yang dapat mereka berikan kepada manusia. Jenis jasa yang dibutuhkan dan besarnya ketergantungan tiap kelompok masyarakat pada jasa ekosistem berbeda-beda. Bumi tidak akan dapat digunakan sebagai tempat berlangsungnya kehidupan jika bukan karena makhluk hidup seperti tumbuhan yang telah menciptakan dan memelihara atmosfer yang sesuai, membusuk organisme yang telah bekerja untuk kehidupan kita sehingga dapat menghambat peradaban kita. dari terkubur dari limbah yang kami hasilkan.*

**Kata Kunci:** *Kerusakan Lingkungan, Ekosistem, Kerusakan Ekosistem.*

## 1. INTRODUCTION

Humans and the environment are the two words that can not be separated. Both each influence. Nature's influence on humans is more passive, while the human influence on nature is more active. In fulfilling their daily needs, activities carried out by humans in nature always cause damage to the environment itself. According to the Law of the Republic of Indonesia on Environmental Protection and Management No: 32 of 2009, environmental damage is a direct and/or indirect change to the physical, chemical, and/or biological characteristics of the environment that exceeds the standard criteria for environmental damage. has advantages over other living things, humans can exploit nature so that they can change nature according to what they want. However, even though nature does not have an active-exploitative ability to humans, what happens to nature will have an impact on human life.

Therefore, the management and protection of the environment must be following environmental rules. Compliance with these environmental principles is to prevent various environmental disasters such as environmental pollution, floods, forest destruction, drought, which may result in a prolonged food crisis, water crisis, energy crisis, and others. The environment we know today is part of the smallest ecosystems that always provide benefits to human life. For example, the growth of a tree can reduce air pollution, purify water, reduce the likelihood of flooding, help regulate the climate by capturing and storing carbon, timber provider for the needs of the building, recreation areas and improve the aesthetic quality of the landscape.

According to the Newsletter of June-July 2000, to be precise in 1972 in Stockholm Sweden a UN conference on the theme of the Environment was held. Although it has been so long declared, the reality of environmental degradation continues to occur almost anywhere including Indonesia. The damage that occurs is in various environments or ecosystems so that it will disrupt the components that make up an ecosystem such as varieties of varieties and diversity of species. Thus, this will have an impact on the extinction of varieties or types of life in an ecosystem. When viewed from the dependence of humans on nature or ecosystems, humans who need ecosystems seem less wise in utilizing their environment. Especially for Indonesia, there has been environmental damage in various places and types of ecosystems.

Irwan, 1992 in Sidik Katili said that every ecosystem responds to a disturbance. Ecosystem response to disturbance is following its importance. Resilience is a feature of an ecosystem that provides possibilities. the ecosystem can recover back to its original balance before the disturbance. Seeing this, it can be said that a disturbed ecosystem can return to its original state. This depends on the size of the resilience possessed by the ecosystem. A disruption that exceeds the resilience of an ecosystem, will result in dynamics that lead to the formation of ecosystem conditions that deviate from the previous ecosystem. Although an ecosystem has great resilience, in general, the limits of its dynamic or homeostatic balance mechanisms can still be

penetrated by human activities. Some examples of activities carried out by humans for nature include exploitation of natural forests (deforestation) that exceeds the limit, the use of hazardous chemicals such as mercury by industry, motor vehicle fumes and factory fumes that have exceeded the threshold, and various other activities. Increased human activity due to the increasing need for goods and services from nature, so that causes a decrease in the ability of nature to provide its services. Nature's ability to provide these goods and services is known as ecosystem services.

## 2. DISCUSSION

### 2.1 Environmental Damage

Since 1970 the world began to give great attention to environmental issues, such as sustainable development to sustain life on earth. However, until now the environment as a vehicle for living things, especially humans, continues to experience damage. Furthermore, it can be said that human behavior towards nature depends on how they perceive nature itself. If nature is seen as important and beneficial then the behavior that emerges is respectful. On the contrary, if not, then the behavior that emerges is destructive. Humans have their perspectives on nature. This perspective becomes the basis for humans to act on nature. One of the ways humans view nature is "Anthropocentrism".

Anthropocentrism is a perspective that places humans at the center of the universal system. This view contains the idea that all policies taken regarding the environment must be assessed based on human interests. It is not surprising, then, that the focus of attention in this view is on increasing human well-being and happiness. Nature is seen as an object for the fulfillment of human needs and interests so that nature is only used as a tool for achieving goals.

With perspectives like the above, many opinions say that anthropocentrism is one of the causes of the environmental crisis. This view has made humans dare to take exploitative actions against nature by depleting natural resources for the sake of their welfare. According to the Secretary-General of the Executive Director of UNEP, 2014, every three seconds of running time,  $\pm 1$  hectare of forest lost from the surface of the earth. The annual average total loss of forest is  $\pm 13$  million hectares. The economic value of tropical forest ecosystem services is estimated at USD 6,120 per acre. This is a staggering number at many levels. Whether we realize it or not, the exploitation of the ecosystem has indeed improved human welfare. However, the continuation of the impact it would cause to the environment is very worrying.

On the other hand, according to Costanza et al., 1997, services from ecological systems and natural capital are important assets for the functioning of life support systems on earth. They contribute to human well-being both directly and indirectly. Therefore, it is part of the total economic value on planet earth. According to Holing, 1973 in Dwi Indrayanti, 2015 states that almost all natural systems have characteristics that change over time, and if humans try to stabilize nature for their interests it will cause conditions to be stable in the short term and catastrophic in the long run.

Increasing community income often does not take into account the overall ecological and socio-economic impacts it causes. Environmental damage has indeed become the stake of the rapid economic growth of a country. The success of a country in lifting its economy is not matched by its success in overcoming several environmental problems that occur. Below you can see the small pressures that humans put on nature that can cause major problems to the environment in the future



Fig. 1 The forest destruction is a cause for concern

(source: <http://upeks.fajar.co.id/2016/10/21/kerusakan-hutan-memprihatinkan/>)

From the picture above, it can be seen that the logging that occurs is a picture of the pressure that humans exert on nature and its environment to improve the community's economy. This is a small example that always occurs in our forest area. Environmental concern only appears insofar as it is related to the interests of human life and even then is more of a short term.

According to National Geographic Indonesia, in May 2016, according to data released by the Directorate General of Pollution and Environmental Damage Control of the Ministry of Environment (KLHK) in 2015, nearly 68% of river water quality in 33 provinces in Indonesia is heavily polluted. The main source of river water pollution in Indonesia is mostly from domestic (household) waste. Liquid waste from



households is the dominant source of pollutants for water. From the household liquid waste, various organic materials can be found that are carried through the ditches to the river. Besides that, sometimes inorganic materials are also carried away such as plastic, aqua bottles, aluminum, and others. The garbage is piling up more and more, clogging the river flow which can cause flooding. This picture occurs in almost every river in Indonesia. One example can be seen in the image below.



*Nasib Sungai Aur kini. Di masa lalu kapal-kapal dagang berlabuh di Sungai Aur, lokasi loji VOC. Namun kini, anak Sungai Musi ini hanya menjadi tempat berlabuh sampah-sampah. Foto: Taufik Wijaya*

Fig. 2 River pollution

(Source:[http://www.ampl.or.id/read\\_article/inilah-cara-pemerintah-palembang-atasipencemaran-sungai-musi/37984](http://www.ampl.or.id/read_article/inilah-cara-pemerintah-palembang-atasipencemaran-sungai-musi/37984))

The figure above shows that the river has been used as a garbage dump that is considered safe for human behavior irresponsible, so it can be deduced that naturally presumably in case the water crisis here and there. Weak government supervision and the reluctance of the public to change unfair behavior towards nature and weak law enforcement as the last step to ensure the enforcement of regulations are separate problems for the occurrence of water pollution which is getting more and more chronic.

On the other hand, the post-reform political transition process has created various legal uncertainties that have resulted in difficulties in implementing various environmental policies consistently. Although formally the government has committed to maintain and manage natural resources sustainably, the reality is far from what is desired.

Besides that, globalization that occurs and the integration of markets has stimulated increased exploitation of natural resources such as oil and gas, forests, marine, and so on to accelerate serious environmental damage. Also, the era of globalization, which is accelerated by the impact of information technology, has

contributed to the unlimited exploration of natural resources so that the availability of natural resources such as water, land, foodstuffs, and other energy sources is increasingly depleting.

## 2.2 Ecosystem

Ecosystem (Oikos = house and system = whole), which is an element of life that is a unitary system that is interrelated and influences one another. Earth can be said to be a very large ecosystem in which there are various smaller ecosystems. According to Pereira, Navarro, and Martins, 2012; Barnosky et al, 2011, habitat degradation, overexploitation of natural resources, invasion of foreign species, pollution, and climate change all affect the existence of ecosystems on the earth's surface. It is estimated that sixty percent (60%) of the world's ecosystems are degraded, thirteen million hectares of tropical forest are lost each year (MA, 2005; UN FAO, 2011). According to Barnosky et al, 2011, loss of biodiversity with mass extinction is an event that we might face if the trend of environmental degradation continues.

Furthermore, Maes et al, 2014; EEA, 2015 in Ecosystem Services and Biodiversity, Science for Environment Policy said that the condition of the ecosystem is an important part of the assessment because it can determine the capacity of an ecosystem to produce services. The decline in biodiversity is a huge loss for the planet and threatens human life support systems on the earth's surface. Services provided by nature are everything we eat to the air we breathe will be paid a high price by humans if we cannot protect nature and our environment as a source of benefit.

Despite these very important ecosystem services to humans, but in the past, this was seen as only limited and unlimited free goods. According to the Secretary-General Executive Director of UNEP, ecosystem services have attracted a great deal of human attention, only after The Millennium Ecosystem Assessment (MA, 2005) and the studies conducted thereafter that have documented the extent of degradation of ecosystem services related to human well-being. So that people just realize that the ecosystem services received by humans have decreased greatly over time, even though each society will have different dependencies on the services of an ecosystem.

Furthermore, it is said that certain ecosystem services such as types of edible legumes or tubers, wood production, and extreme climate balancing are services that are very important for the life and food security of the poor. Meanwhile, in other societies, cultural and religious services may be more valuable than other services. Thus the community can interpret a condition provided by an ecosystem based on the ability of the ecosystem to provide its services.

In some cases, the services provided through the ecosystem are difficult to quantify such as the enjoyment of a beautiful view. However, the basic concept remains the same, where ecosystem services are services that provide benefits to

people's lives. According to Barrow, 2006, for certain people such as artists, one of the services from nature that can be enjoyed is "nature as a source of inspiration" so that nature cannot be destroyed so that it can still provide benefits. Here are presented the services and payments for ecosystem services of water as seen in the picture below.

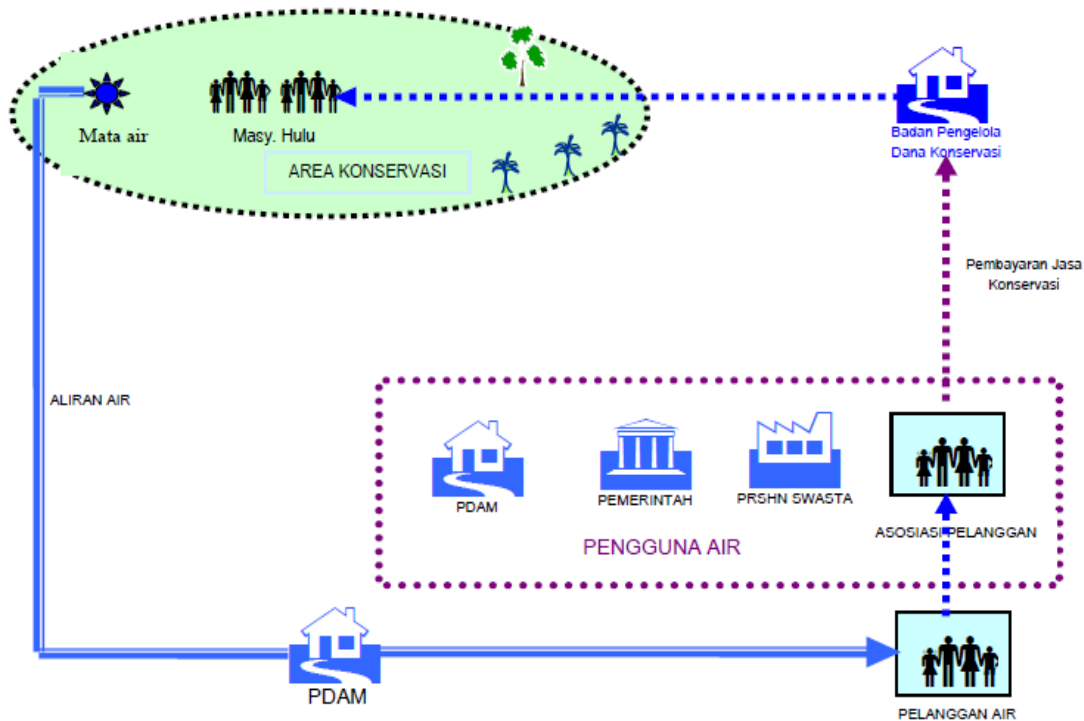


Fig. 3 Model: Water ecosystem services and payments for services. WWF Indonesia, 2011.

Good ecosystem management will be able to help alleviate poverty and achieve sustainable development. On the other hand, it is said that economic development carried out by stakeholders has led to ecosystem degradation. Human welfare and progress towards sustainable development are very much dependent on how people/communities manage and utilize ecosystems sustainably. When the need for ecosystem services such as food and clean water increases, at the same time human activities have decreased the ability of various ecosystems to meet these needs. To help the recovery of an ecosystem, policy and management interventions can restore degraded ecosystems, so it will increase the role of these ecosystems for human well-being.

According to Mooney and Ehrlich, 1997, Sekercioglu said that, although people have long been aware that the natural ecosystems greatly help to support human life, the explicit recognition of ecosystem services is still relatively new. Planet Earth is

an extensive network of integrated ecosystems. Changing one component can have drastic effects on another component. Ecosystems purify the air, water, produce oxygen, and stabilize the climate. The earth would not be suitable for survival if it were not for natural services such as plants that have created and maintained a suitable atmosphere, decomposing organisms that have worked for our lives, then all of this could prevent our civilization from being buried by the trash we create alone.

### 2.3 Impact Of Environmental Damage On Ecosystem Services

Indonesia is one country in the world that has incredible natural wealth. From an environmental point of view, this natural wealth is better known as biodiversity. However, this wealth is currently experiencing serious environmental degradation as a result of irresponsible human behavior. This irresponsible behavior is manifested in the form of illegal logging, gas pollution from burning fossil fuels, and so on. All forms of these behaviors provide a very significant contribution to environmental damage, affecting the degradation of biodiversity.

Forests are the main source of biodiversity because forests are home to various types of animals and plants. Damage that occurs in forests is the cause of the decline in biodiversity and even extinction. This should not happen because in such biodiversity there are so many natural secrets that have not been revealed. It could be that drugs for dangerous diseases at this time that has not been found are stored in our tropical forests which are experiencing environmental degradation. If you look at the enormous potential of the forest, it is only natural that some people will speak out loud when they witness the various forest destruction that has continued to this day.

Besides, forest damage can cause soil erosion and land degradation because the land becomes open from sunburn and rain that occurs all the time. In general, open land can cause the loss of important functions of the forest, such as the function of regulating water (hydrology), regulating microclimate, producing litter and humus, as a habitat for wildlife, and protection of local varieties and species of plants. So it is not surprising that various types of local plants, including traditional medicinal ingredients, are increasingly scarce due to a lack of cultivation.

Extinction is a real threat to various living things. However, the extinction that befell tens and even hundreds of species of animals and plants on earth is not the result of natural selection alone. The extinctions that occur are caused more by human behavior that is not responsible for nature and the environment. World Wildlife Fund (WWF) noted, 17,291 species are endangered from the earth's surface due to various reasons. Craig-Hilton Taylor said that what was recorded was only the tip of the iceberg of the actual natural conditions. This means that the number of endangered species could be more than that but not recorded in the survey.

If seen from the environmental damage that occurs at this time, many factors can cause the extinction of biodiversity. Among these factors are:



### 2.3.1 Loss of habitat

Habitat loss due to agriculture and unsustainable forest management is the biggest cause of biodiversity loss. The population that is increasing day by day causes more and more needs that must be met by nature. Besides that, the availability of land for animals and plants is getting narrower day by day due to the conversion of land functions from agriculture to human habitation and industrial land.

### 2.3.2 Pollution

Contaminants (pollutants) is a waste product generated from human activities. These pollutants can contaminate soil, water, and air. These pollutants are very dangerous for life (organisms). Nitrogen and sulfur oxides are produced from motorized vehicles, which when reacting with water can form acid rain which can damage the ecosystem. Excessive use of chlorofluorocarbons (CFCs) can damage the ozone layer so that the ultraviolet rays that reach the surface of the earth increase so that it disturbs the balance of the food chain of living things.

The destruction and extinction that occurs in biodiversity can damage the function of ecosystems, so this is an obstacle for nature to provide its services to human life. Human life is always dependent on the services provided by its ecosystem. Although humans already have high culture and technology as well as exploitative abilities for nature so that they can change nature according to what they want, in the end, humans will still depend on the flow of ecosystem services.

Thus it is now clear that the effects of the worldwide degradation of ecosystems have reduced the services they can provide to humans. Millennium Ecosystem Assessment (MEA), in Rosa, has classified ecosystem services based on their function:

1. Provision of services such as food sources, natural medicines, genetic resources, firewood, fiber, water, minerals, and others.
2. Regulating services such as functions to maintain air quality, climate regulation, water regulation, erosion control, water purification, waste management, human disease control, biological control, risk reduction, and others.
3. Cultural services such as cultural identity and diversity, religious and spiritual values, knowledge (traditional and formal), the inspiration for aesthetic values, social relations, heritage values, recreation, and others.
4. Supporting services such as main production, soil formation, oxygen production, soil resistance, pollination, habitat availability, nutritional cycle, and others

Ecosystems have provided many benefits for human life such as food supply, clean water, flood protection, cultural heritage, and others. The many benefits of these ecosystems are currently under severe pressure and threats from irresponsible human behavior.

### 3. CONCLUSION

Environmental protection and management must be following environmental principles. If not, it can cause various environmental disasters. The environmental damage that has occurred so far is the result of weak government supervision and the reluctance of the public to change inappropriate behavior towards nature as well as weak law enforcement as the last bastion to ensure the enforcement of regulations. If we can not keep nature as a source of benefits for the giver of human life then it will affect the weakening of the ability of ecosystems to provide services for the life of human beings, so that would make high-cost human lives.

### REFERENCES

- Barrow, C.J, *Environmental Management for Sustainable Development, Second Edition*, NewYork, Routledge Taylor & Francis Group, 2006.
- Costanza, Robert dkk, *The value of the worlds Ecosystem Services and natural capital*, Univesityof Stockholm, Sweden, NATURE, Vol. 387, 1997.
- Dwi Indrayanti, Martini,dkk, *Penilaian Jasa Ekosistem Mangrove di Teluk Blanakan Kabupaten Subang*, IPB Bogor, Jurnal Ilmu Pertanian Indonesia (JIPI), Vol. 20, 2015.
- Kosmus, Marina, Renner, Isabel and Ullrich, Silvia, *Mengintegrasikan Jasa Ekosistem kedalamPerencanaan Pembangunan, Pendekatan selangkah demi selangkah bagi praktisi berdasarkan Pendekatan TEEB*, Boon, Germany, DeutscheGesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH, 2012.
- Rooswiadji, Tri Agung, *Jasa Ekosistem dan Pembayaran Jasa Ekosistem Air*, NationalCoordinator for Freshwater Program, WWFIndonesia, 2011.
- Rosa, Herman, Kandel, Susan and Dimas, Leopoldo, *Compensation for Ecosystem Services and Rural Communities : Lessons From The Americas*. Penerjemah : AunulFauzi, PRISMA, www.prisma.org.svCOSYSTEMIC
- Sekercioglu, Cagan H, *Ecosystem Functions and Services, Chapter. 3*, Oxford University Press, 2010.
- Sidik Katili, Abubakar, *Penurunan Jasa (servis) Ekosistem Sebagai Pemicu MeningkatnyaPerubahan Iklim Global*, UNG, Tanpa tahun.
- [http://www.ampl.or.id/read\\_article/inilah-cara-pemerintah-palembang-atasi-pencemaran-sungaimusi/37984](http://www.ampl.or.id/read_article/inilah-cara-pemerintah-palembang-atasi-pencemaran-sungaimusi/37984) (diakses 8 Desember 2016).

<http://upeks.fajar.co.id/2016/10/21/kerusakan-hutan-memprihatinkan> (diakses 8 Desember 2016)

....., *Ecosystem Services and Biodiversity*, Science for Environment Policy INDEPTH REPORT, 2015.

....., *Integrating Ecosystem Services in Strategic Environmental Assessment : A guide for practitioners*, UNEP, Project for Ecosystem Services, 2014.

....., Tajuk Warta Kehati Juni - Juli 2000.

....., UU Republik Indonesia Tentang Perlindungan dan Pengelolaan Lingkungan Hidup Nomor : 32 tahun 2009.