

THE CONTEXT OF CHANGES FOR LAND RESOURCES METABOLISM IN URBAN WILD AREA

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ABSTRACT

Natural protection and ecosystem conservation in a city is current issues in globalization and industrialization. This article applies urban political ecology concepts and biological metabolic study for public policy analysis innovation in urban wild area changes context. First will be explained the land characteristics on a macro-scale regarding the seven characteristics of the colony of life system. Then, will be creating a land metabolism for a land ecology analysis. The metabolism has two sub-processes: land catabolism and land anabolism. From this concept, we can sketch a specific land metabolic pathway for urban wild changes study for each case. In a second step, is possible to compare the relationship between an urban area and an urban wild area from the land metabolic pathway. Such relationships have two types: land symbiosis and land antagonism. In the final step, is possible to create a public policy recommendation or a public policy feedback for an urban wild area conservation based on land relationships. That public policy will be a natural friendly public policy and a sustainable public policy for a city and an urban wild area.

KEYWORDS: Urban Wild, Public Policy, Urban Political Ecology, Land Ecology, Land Resources Management, Urban Management and Urban Ecology

INTRODUCTION

Landscape Ecology in a City

The city is human natural habitat. Mankind can not survive without a city environment (Aristotle, 2009). In the modern era, the human being needs living factors from cities such as public services, occupation, governmental services, commercial market, consumables, money, financial services, among others. Humans have created and developed the city in a very convenient and comfortable for human way of life. However, the city is not only for human occupation, it has other organism's live inside such as flora, fauna, and microorganism. The city is the diversity of ecological areas and systems (Sven Erik Jorgensen, 2009).

City is the nature of mankind, but the city is adulterated thing of nonhuman life: every city around the world comes from a wild area in human history. However, human can not disclaim wild area because they need ecosystem services from wild area such as fresh air, fresh water, fresh food, natural scenery, natural recreation, etc. (Per Bolund and Seven Hunhammar, 1999). In this regard, most of the city governors and city planners try to design metropolis have natural space or open space. However, the way to create a natural space is more difficult than the natural conservation processes. Nature conservation and environmental protection in urban area is tasked because city government must keep balance between urbanization and naturalization (Yajie Song, 2009).

On the other hand, townsmen change from a wild area of urban civilization, while it is natural habitat changes in natural organisms. Some species can adapt themselves to urban living, including anatomy, physiological mechanism, behavior and genetics. But some of them can not do it and it means they are extinct. Urban wildlife and urban plants can survive in an urban wild area and it makes city has biodiversity. Urban forest and urban biodiversity are new area of urban management and planning. Many people often think forest and biodiversity should live in a remote area, but this idea is not the best way for environmental conservation. The way for equilibrium protection in urban ecology between urban development and urban wild conservation is a challenge for city governor and public policy planner (Ann P. Kinzing, 2005).

This article tries to explain urban wild area changes by urban political ecology concept, analyzing because the concept explains the mechanism of urban process. We use the urban wild area as the unit of analysis and it is a macro-scale diagnosis. Human make legal mandates for land uses in the city, so we can not overlook political ecology when we study landscape ecology. If we understand the metabolism of urban wild area changes in political and natural contexts, we can palliate and solve environmental problems in the city. The land resources, study are land resources metabolism and the study try to integrate many areas for land resource analysis: for example, political sciences, public administration, ecology and geography. Land resources metabolism tries to explain land ecosystem phenomena inside a city because urban area and urban wild area are part of a city ecosystem. Understanding the ecological natural limitation and land ecosystem phenomena are what humanity should find a way to not break the limit of a city ecosystem (Didem Dizdaroglu, 2010).

Urban Wild Area vs. Urban Area

All cities around the world have urban area combined and overlaped with urban wild area. The urban wild area is natural land and natural ecosystem that still maintains wilderness in the midst of developing and developed urban area. In other words, an urban wild area is natural habitats inside the city and living creatures in urban wild area can evolve and intimate with the urban environment and urban atmosphere. (P. O. Cheptou, 2008)

The Urban wild area has many kinds and they are a natural urban ecosystem such as a public park, private garden, orchard, river, lagoon, canal, bay, beach, mangrove forest, urban forest, hill, fallow etc. Urban wild area can be categorized in 3 groups.

Natural Urban Wild Area: It is naturally occurring and human does not build it. Urban people let that area remain natural and they do not interfere with that too much, but some areas have effect from urban development. Examples are bay, lagoon, river, hill, beach, sea, urban canopy and etc.

Man-Made Urban Wild Area: It is a human sectional area and it looks like natural area. All of these areas are human space utilization such as a public park, garden inside university, reservoir, zoo, botanical garden, agriculture, temple and etc.

Semi-Natural Urban Wild Area: It is naturally occurring, but people go into that area for capitalization and amendment and that are still nature. When people do not intervine this wild area, it becomes an urban area or parts of the city such as hill inside public garden, natural lagoon inside the university.

It is not easy to identify the different types of urban wild area because every group appearance looks like natural ecosystem and every type interweave together in the city.

- Urban area and urban wild area have changed from time to time in the city and they have related together. If we want to study both area relationships in the macro scale, we can analyze area changes or land resources metabolism, based on the urban wild area and urban area characteristics. Such characteristics compare as an organism that can be classified as follows (Chris P Mckasy, 2004):
- Urban wild area and urban area composed of many ecosystems. The urban wild area is full of sub-ecosystems inside the city and urban area also is filled with many urban communities. Every unit in both of the areas has complex internal and external processes, as well as all of them can be compared to cells life process.
- Urban wild area and urban area have homeostasis system; they try to keep balance inside and between ecosystems base on natural mechanism, for exsample degradation, photosynthesis, biological control, chemical cycle, food web. This leads to a biological balance alike bio - body. However, natural mechanisms in the city are limited and they can not support all of human needs because human have not limiting of needs. Moreover, most of cities stay at over supply of natural infrastructure, so they get pollution and environmental problems (David Pimentel, 1994).
- Urban wild area and urban area metabolism are based on the way they consume many resources and also adsorb many of them from non-city area or other city area such as energy, food, human resource, water, wood, cement, minerals. They use every resource to transform it into goods and services. All of recourse transformational processes are similar to the metabolism in life (Nik Heynen, 2006).
- Urban wild area and urban area have changes because they are dynamic all time. The changes are caused by many factors such as natural changes, season, public policy, people needs, war and etc. Both of the area's growth and development in and they are reduction and degeneration too. (Shen Hou, 2012)
- Urban wild area and urban area can adapt for changes from urban activities as well as they easily get familiar with the new environment. Because both areas stay in the area that has changed over time and life in both ecosystems, these can evolve for survival in a city. However, they have an important condition that is urban environment should not much over limitation because every life have limit of adaptation. (David Satterthwaite, 2007)
- Urban wild area and urban area can respond from changes, but the response is slow because land is huge scale. The response of both areas can show in GIS or satellite image history and its land uses, land cover changes, environmental changes and geological development. Land responsiveness aren't immediate and it takes time for changes proved (Frederick R. Steiner, 2009).
- Urban wild area and urban area correspond to behavior resemble reproduction because they can multiply urban area and urban wild area such as urban sprawl, hinterland increase, natural park increase, etc. They do not come from reproduction process but they come from human behavior and public policy (Robert I. Mcdonald, 2008).

From seven characteristics of life process, urban wild area and urban area's traits are similar to organisms. So, we can study land changes by biological comparative study, that is to say the land in macro-scale looks like colonies of animals such as coralline algae, sponges and coral. If we want to understand this colony, we should understand the metabolism of them. Urban political ecology is a way to study the changes of the city, so this concept would be appropriate with metabolism of land changes.

Academicians use urban political ecology for city metabolism study such as natural resources, public policy, river, food, water resources and petroleum. They are micro-scale study because they focus on the detail view of the city changes. But we have not researched in land metabolism by urban political ecology study and it is holistic view of city changes so, this paper tries to develop this concept to study tools in land resources management. Urban political ecology is the conceptual link between natural ecology changes and political mechanism in the city because they have many factors, actors, stakeholders, institutions and contexts. Consequently, land ecology in urban political ecology study is interesting and challenging.

Land Metabolism: Interaction between Politics and Nature

Understandings how the circulatory system within urban wild area, we should understand whole factors related with land changes in the city and then we should understand land metabolism processes that are land catabolism and land anabolism (Figure 1).

City land changes' factors are (Shukui Tan, 2014):

Geographical Factors: In macro-scale, geological factors are one of importance determinants because when this factor changes, for example coastal erosion, changing of the river corridor, proliferation of land, land subsidence, tsunami, earthquake, weather changes and etc. Every factor can change city's land and they can remodel land form, land uses and land ecology. They also have an effect with urban area changes and urban wild area changes in macro-scale and we can trace both area changes from GIS and satellite images.

Political Factors: Government has a duty to administer their territory, so land change when they have public policy for land management and every public policy come from political demand and political environment such as governmental policy, the demands of the people, benefit group and pressure group, stakeholder group, global condition, etc. Every public policy has a direct and indirect effect with the urban area change and urban wild area changes.

Socioeconomic Factors: Development and growth of the city come from resources and life consumption because the city adsorb many things from non-city area such as people, money, natural resources, labor and soul. So socioeconomic factor has an effect with urban area changes and urban wild area changes such as economic development, slum procreation, seizing the wilderness, animal hunting, cultural change, industrialization, etc. If that city is a global city, socioeconomic factors of globalization will have incidence more non-global city and it is a catalyst for both of land changes.

Urban Population Factors: Most of the world population lives in the city, thus, population factors have an influence in urban area and urban wild area. Such factors are migration of the population, birth rate and death rate, quality of population, unemployment rate, latent population, etc. Every metropolitan needs land uses for living necessities, for example residential construction, food farming, job operation, commercial operation and recreation. Every factor has direct and indirect effect with the urban area change and urban wild area changes.

All factors mentioned before are an important part of land metabolism in urban area and urban wild area changes and they are pushing factor and pull factor for land changes in macro-scale because some factors support land changes and some factors inhibit land changes in the same time (Anna Zimmer, 2010).

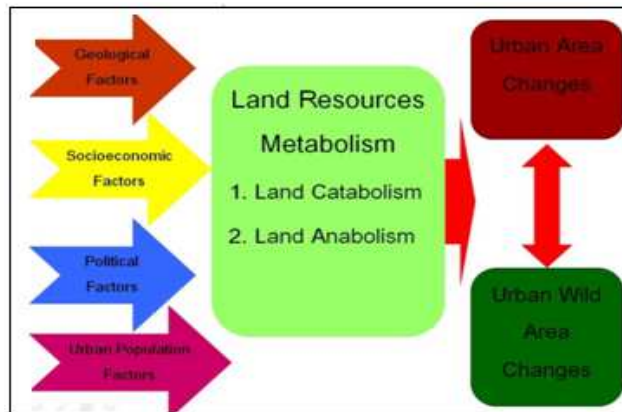


Figure 1: Land Metabolism Process

When these four factors participate in the land metabolism process (Figure 1), all factors have co-reaction together and variables will play a dominant role or a recessive role; it will depend on the circumstances time and context of each city. Within this four factors' process. There are two sub-processes of metabolism:

- Land Resource Catabolism

Catabolism is process transforms from large molecules into smaller units in biological metabolism. So we can use this concept for the land resources, study by holistic analysis of urban wild area changes. All factors go into a city and then the city's governor will make public policies for land uses or city developing plan. City government takes all factors to evaluate in land uses design and they will give priority with factors in public policy making. It can compare to the bio - body digest food to nutrient. So role of city government officiate like enzyme in land metabolism (Figure 2).

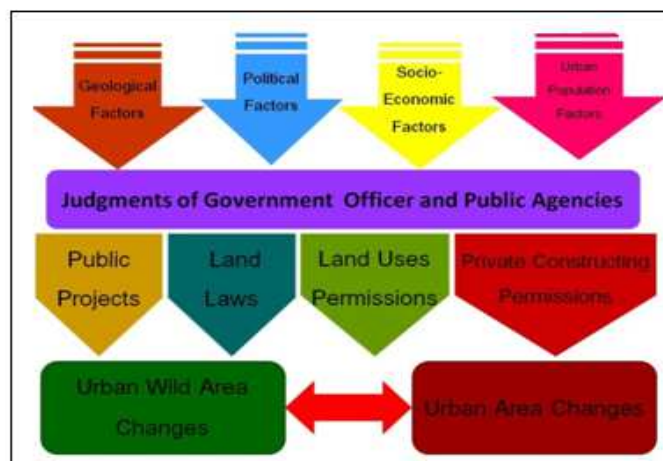


Figure 2: General Land Catabolic Processes

City government is the main actor in land resources catabolism because they are statutory authority in land use planning and land development. Final product from land catabolism is a public project, land law, land use permit and private constructing permission because they come from judgment of governmental officer or public agency and every city have city planning and city zoning. However the city is not the only actor in land resources metabolic process. The city is a melting pot, which make more complex the land metabolic actor identification and land catabolism partway drawing (Jari Niemela, 1999).

All of land catabolic products affect with urban wild area because urban wild area is a sub-set of urban ecology and urban management system. Thus, every urban governmental decision and selection will have an indirect and a direct effect within urban wild area. But we can not adjudge urban public policies disturb urban wild area because land catabolic products have positive, negative and side effect impacts within urban wild area. All of land catabolic products will be transported to next land resources metabolic sub-process.

- Land Resources Anabolism

All of land catabolic products do not directly move through urban area and urban wild area, but they pass through another process for urban area and urban wild area creation. It compares with the process uses energy or biochemistry to construct components of cells, tissue and organs. The anabolism process is the one that constructs molecules from smaller units. On the other side, land catabolism products correspond to: public project, land law, land use permit and private constructing permission: move through anabolic actors in urban area growth, urban wild area changes and urban ecology changes (Erik Swyngedouw, 2012).

City's dynamics have many stakeholders as well as many land anabolic receptors or urban land policy implementation carriers. Stakeholders categorize in four groups (Figure 3):

- **Public Actors:** Correspond to public organizations that stay or work within the city. Some organizations are part of local public sectors, but some of them are international public sectors. As examples, national government, local government, court, police, city council, politician, embassy, consulate, international organizations, NGO, university, research institute, etc. All the actors take land catabolic products and transform them into land anabolic products depending on public organization duties. Some products concern behavioral action, physical action or conceptual action, for example city infrastructure, organizational policy, verdict, investment promotion, environmental campaign, tourism promotion, legal implementation, consulting, city decoration, public poll, etc.
- **Civic Actors:** Correspond to urban residents and they are both permanent townsmen and temporary townsmen such as urban citizen, tourist, student, worker, businessmen, civil society, civic community, etc. All of the actors take land catabolic products transform to land anabolic products that depend on the social role and interests such as lawfulness, tax payments, researching, protestation, work, trade, study, migration, etc.
- **Private Actors:** These are important urban land policy actors in capitalism and democratic systems. At the present time, they are policy followers and policymakers at the same time. They are private organizations inhabiting inside a city. All of the actors take land catabolic products to transform it into land anabolic products that depend on their interest and their needs, such as lawfulness, tax payments, protestation, depreciation, pressure, trade disqualification, etc. Examples of actors are a private company, professional council, foundation, association, chamber of commerce, political party, etc.
- **Unidentified Actors:** Many cities are not only belong to that city's residents but they also belong to nonresidential people. Some cities around the world are important cities in national, regional and global levels and it is related to how many cities are capital, main city of the region, hub city of region, international city and the global city. Every famous city's governor around the world tries to create their own city with especial character, unique style and global popularity. Moreover cosmopolitan life occurs in global villages. These are also connected

to international social media, which allow nonresidential people to have an influence in a city although they've never visited there. All of these actors take land catabolic products to transform it into land anabolic products that depend on their interest, need, fancy, taste and idea such as trade some goods from a city, vote for top city ranking, comment in social media, transit a city, buy some products that relate a city, etc.

Thus, urban land policy implementation carriers take land catabolic products transform to land anabolic products that are not only physical urban objects: residence, business community, agricultural farm, road, airport and its. However, these are composed by abstract urban objects, for example popularity, affection, reputation, evolution, prosperity, vanity, reliance, etc. Every urban object is important for a city in globalization era and they also effect with urban wild area changes (Jean-Pierre L. Savard, 2000).

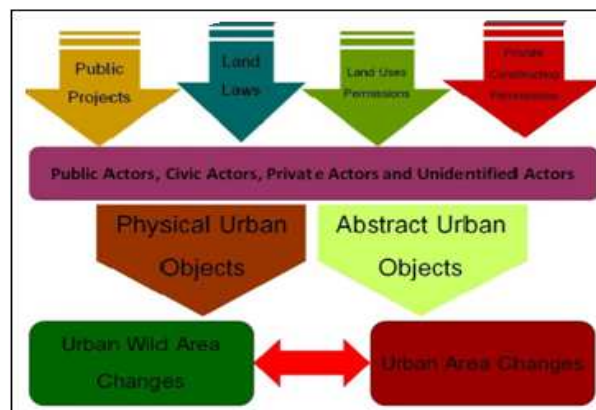


Figure 3: General Land Anabolic Processes

Land metabolism transforms urban wild area changes into quantitative way and qualitative way - quantitative changes increase or decrease in the size of urban wild area and qualitative changes is changes within urban wild area or urban wild ecosystem - as for example as toxic pollution, extinction of urban plants and urban animals, increase or decrease of urban microorganism, urban climate change, increase or decrease of certain chemicals in urban nature, etc. Every changes affect town-dwellers in direct and indirect ways, but urban people can not sense some of urban wild qualitative changes because we have not sensitive feeling organs and have limit of sensory system but animals and microorganisms have them (Jingyun Fang, 2006), therefore land metabolism study in urban wild changes is an innovation for urban natural ecosystem understanding and sensing.

Specific Land Metabolic Pathway Drawing: Unlike City, Different Contexts

We have many cities around the world and no cities are similar in every factor such as geography factors, political factors, socioeconomic factors, population factors, urban actors, city background, etc. If we want to sketch land metabolic pathway in every urban wild area changes around the world, we should draw them case by case. When we understand the land metabolic mechanism from the pathway, we can diagnose the causes and issues make urban wild area changes and it looks like medical diagnosis in hospital. Land metabolic pathway is approximate with pathogenesis and it is an urban policy planner supporting and helping.

However, the integrated land metabolic pathway that can embrace everything and that influences urban wild area changes. It is not easy to draw because it is difficult to identify factors and actors in the land metabolic process. Factors and

actors are hidden and ambiguous, while some cities have many factors and actors. Thus, we can sketch separating land metabolic pathway for specific city by focus some factors or only one factor. It makes us understand some mechanism of urban wild changes and we can diagnose different cause of urban wild area changes. It is not integrated pathway but it is precise pathway. On the other hand, we can piecemeal sketch metabolic pathway in a factor or an actor and then we piece all of the factors and actors' pathways to integrate pathway as jigsaw puzzle playing. It will result in a solution hit to the point even more and it looks like specific medical diagnosis (S.K.McMahon, 2002).

First step, we should check our city has urban wild changes or urban natural ecosystem changes. We can survey urban land by geological technique such as satellite image, aerial photograph and land survey. If we have urban wild changes in our city, we should analyze factors in a second step such as: geography, politics, socioeconomics and population: As well as actors: such as public actors, civic actors, private actors and unidentified actors: in that city. Third step, we can start to sketch land metabolic pathway in urban wild area changes and we try to research in all process of the land metabolic pathway. Fourth step, we should identify which physical urban objects and abstract urban objects have been affected by urban wild area changes and which urban area changes have effect with urban wild area changes. The last step, we should find relation between urban wild area changes and urban area changes. When we know the relationship between urban area changes and urban wild changes, we can use all of information to make public policy option and urban management planning (Luxin Huang, 2010).

Interaction between Urban Area and Urban Wild Area in Land Ecology

As mentioned in at the beginning of this document, urban area and urban wild area in macro-scale can be compare as two bio-colonies in the city. Thus the study of the relation and interaction between large areas should be based on an ecological method. Both areas' characters can be compare with group of lives that are two ecosystem inside one ecosystem: urban area and urban wild area inside a city's ecosystem. We can apply ecological interaction between animals in ecosystem in urban wild area changes. These are:

Land Symbiosis: Symbiosis mean living together, so land symbiosis are peaceful relationships between urban area and urban wild area in a city because no one disturbed and hurt each other. This condition will happen when city people can keep a balance between urban area changes and urban wild changes in quantity and quality. The relation between both areas can be mutually supporting, benefit-sharing and one party get the benefit but the other party is not disadvantaged. This land eco-relation shows that a city has natural friendly public policy, sustainable development and green unequal treatment (Yong Geng, 2010).

Land Antagonism: The antagonism refers to a relationship where only one party gets all the benefits while the other party is in disadvantage. Land antagonism is benefiting unilateral relationship between urban area and urban wild area. On the other hand, both parties take and give benefit together, but it is not equal benefit sharing, thus urban wild area will lose natural balance in the urban wild ecosystem. This condition will happen when city people can not keep balance between urban area changes and urban wild area changes in terms of quantity and quality. The relation between both areas can be urban wild parasitism, urban wild chopping, competition for the uses of live things in urban wild and urban wild balancing prohibition. This land eco-relation shows that a city has a non-natural friendly public policy, balancing problem between industrialization, environmental protection and human centric development.

Interaction between urban area and urban wild area are impact of land metabolic process as well as they have a positive impact corresponding to land symbiosis. The negative impact corresponds to land antagonism in land resource ecology. When we understand land metabolism regarding the whole system, we can analyze and consider the guidelines of environmental protection and natural conservation in a city (Matthew Gandy, 2004).

CONCLUSIONS

Land Resources Metabolism as a Land Resource Scanner

Land resources metabolism analysis constitutes an innovating input for the urban wild area conservation and sustainable development in the city. It balances measurements between urban wild area changes and urban area development. It can compare with an x-ray scanner or an ultrasound scanner at the hospital because they are macro-diagnosis. When physician knows cursory cause of the disease from scanner, they will thorough analysis for second checking and confirm diagnosis and then they will heal and treatment patient. So land resources metabolism is a macro-scale land scanner (Figure 4).

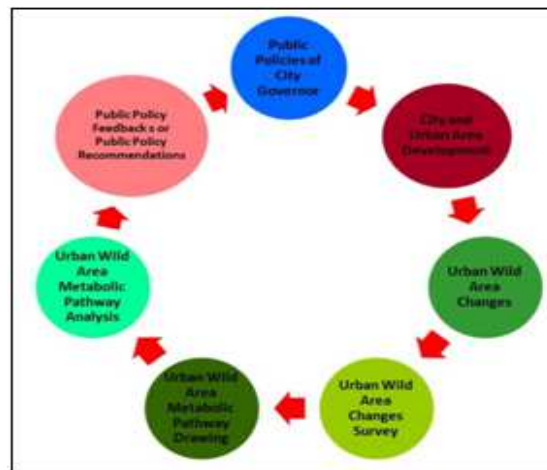


Figure 4: Land Metabolic Pathway in Public Policy Process

This social innovation has limitations, but these are the ways of variables identification such as city governor public policy, actors, urban objects and factors. Because this way is backward analysis. We can draw a land metabolic pathway after we see urban wild area changes. Many variables do not appear, and are not fresh because they changes when time pass. However this process is one of land ecology policy feedback in the public policy process for city planner and governor. It also is non-human centric public policy analysis for urban wild area changes because we use a natural as precursor's analysis.

Environmental protection and nature conservation are current, important and severe issues for government and people. It is not easy to keep balance between conservation and development in a sustainable way. Land metabolism is one of alternative tool for public policy evaluation in urban wild conservation and it also is equilibrium protection between natural ecosystem and urban development in the city. Mankind is still one part of the natural ecosystem.

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