



# *Implementation of Effective Urban Agriculture to Control Air and Food Security in Urban Areas*

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**Abstract**—Regarding air control, the Government of Indonesia has established policies related to this issue which are regulated in Law of the Republic of Indonesia Numbers 32 of 2009 concerning Environmental Protection and Management, especially article 67 which reads "Everyone is obliged to maintain the preservation of environmental functions and controls pollution and / or damage to the environment". Regarding this article, there is an important point that must be observed, namely related to everyone's obligation to control environmental pollution, one of which can be done by Urban farming. This paper uses a type of normative research and qualitative approach, which is guided by legal materials such as Law No. 18 of 2012 concerning Food and Law of the Republic of Indonesia Number 32 of 2009 concerning Environmental Protection and Management. This paper aims to analyze the impact of Urban farming on aspects of food security and air control as well as ideal concepts related to the application of Urban farming. Especially in urban areas as densely populated areas within a country.

**Keywords**- *Urban Farming; Food Security; Air Control.*

## I. INTRODUCTION

Urban regions are significant places for entrepreneurs to create and grow their enterprises since they are home to industry, housing, offices, and other company kinds. This is one of the things that makes the conversion of farmland to non-farm land more likely. The reduction of agricultural land, particularly in metropolitan areas, might pose a threat to the food security of a nation. Law Number 18 of 2012 states that in order for urban communities to meet their food needs on their own, they must be able to do it independently. To achieve that aim, the government and the community must collaborate to find sensible solutions. The utilization of land and space is impacted by the existence of industrial factories. The area of agricultural land decreases due to increased land use, and this results in the conversion of agricultural land into buildings and residential areas [1].

The Republic of Indonesia Number 32 of 2009 concerning Protection and Management Environment Life, specifically Chapter 67, contains regulations pertaining to air control that have been established by the Indonesian government. The regulations state that "every person is obliged to maintain the sustainability of environmental functions and control environmental pollution and/or damage." [2]. There are some crucial elements about this article that need to be noted, such as everyone's responsibility to reduce pollution in the environment and life, which is something that only urban farming can accomplish incorrectly.

The issues of food security and air control may have alternate solutions provided by urban farming, sometimes referred to as city farming. This is particularly true in cities, where growth and land conversion decrease the amount of available land. Urban farming is a new trend that is popular, particularly in cities. A remedy to urban farming techniques that emphasize growing on a little amount of space is to garden at home in the remaining yard. Urban farming is a subset of agricultural cultivation known as "integrative cultivation," which mixes farming, fishery, and/or animal husbandry, or "urban agriculture." [3]. Yards are used in urban farming to maximize land use. Urban yards are defined as undeveloped land; however, since urban regions share comparable land constraints, residential yards are also included in this category.

Urban gardening, which may also meet demands, is one way to improve the quality of the clean air in large cities. Over 7 million people have died globally as a result of air pollution, according to the World Health Organization (WHO), primarily as a result of poor air quality in large cities. Climate change is also influenced by poor air quality. In fact, urban gardening can aid in

enhancing air quality [4]. It is crucial to realize that urban farming is crucial since, in order to comply with environmental laws, it is necessary to study the possibility of increased population expansion, which naturally calls for the production of food. But with urban farming, land availability is no longer an issue. Food resilience and stable, high-quality air will be attained if this is really done. The impact of application farm city on the environment, the impact of application farm city on resilience food, and the optimum concept for application farm city are the three formulation problems that the writer presents.

## II. METHODS

The writing method is a scientific data collection strategy used to support, explain, develop, and uncover new information regarding certain concepts, theories, practices, and goods. This approach can be used to comprehend, resolve, and foresee issues in human existence [5]. In writing this, normative procedures are applied. "Normative legal writing is a process of identifying legal rules, legal principles, and legal doctrines to find solutions connected to the legal challenges addressed," according to Peter Mahmud Marzuki. "Normative legal writing is also termed "doctrinal legal writing." [6]. Finding knowledge regarding the issue under investigation and resolving the primary issue are the goals of this writing strategy. For the goals of legal analysis and elaboration, the author will be better equipped to make use of the findings of research in normative and empirical law, as well as other domains. This normative legal literature employs a conceptual approach that looks at other relevant regulations in addition to the statutes controlling food security and the environment. This will facilitate the use of research findings for legal analysis and elaboration by writers in the domains of normative and empirical legal science, among others.

## III. DISCUSSION

### A. *The Impact of Implementing Urban Farming in Urban Areas on Environmental Control*

More urban growth is displacing green spaces more and more. Residents in cities are experiencing health problems as a result of rising pollution. The idea of creating open green space in the center of crowded cities is known as urban agriculture, and it provides a solution [7]. Metropolitan gardening has the power to make dirty metropolitan areas livable and healthy. Urban agriculture can be defined as a variety of farming and food production practices that are practiced within urban environments. Urban dwellers, according to a number of nations that engage in urban agriculture—including the US, Hong Kong, Germany, and a few others—desire a natural environment and clean air. The degree of socialization that people who are typically individualistic in urban settings can receive from this activity can also be raised. Green places are being displaced by an increasing amount of urban development. Urban dwellers' health is negatively impacted by pollution, which is increased when there aren't enough green spaces. The idea of urban farming then provides a solution by establishing open green space in the midst of a densely populated urban area. Metropolitan gardening has the power to make dirty metropolitan areas livable and healthy. Urban agriculture is, to put it simply, the collection of farming and food production activities that are done within urban environments. Many nations that engage in urban farming, including the US, Hong Kong, Germany, and a number of other nations, think that urban dwellers desire a natural environment and clean air. The generally individualistic metropolitan communities may become more socially integrated as a result of this activity. This activity can not only maintain food security but can also maintain the city's climate, thereby "cooling" the area.

One aspect of the urban dweller's aim to lead a healthy lifestyle is urban farming. Urban gardening is made safer by using an organic planting method that eschews petrochemical pesticides and chemical fertilizers. Furthermore, it is thought that mental-refreshing home gardening projects like urban farming can help reverse the downward trend in city dwellers' quality of life. Green plants undertake photosynthesis, which yields oxygen after taking in CO<sub>2</sub> or carbon dioxide. Urban farming can be accomplished by providing plant containers, planting media, irrigation, and plant seeds. Plants of many kinds can be grown using the concept of a city. Beginning with fruits, vegetables, floral plants, and household spices. This kind of plant creates oxygen during photosynthesis and takes in airborne pollutants.

The public pays great attention to environmental regulations regulated in Law of the Republic of Indonesia Number 32 of 2009 concerning Environmental Protection and Management, especially article 67 which states that "Every person is obliged to maintain the preservation of environmental functions and control environmental pollution and/or damage." Here, the obligation applies to everyone, because everyone is required to participate in environmental control, especially air control, through the use of urban farming. Urban farming will be a solution for recycling organic waste (such as fertilizer) and inorganic waste (such as plastic bottles) in addition to reducing air pollution, so this movement will protect the environment.

Promoting urban agriculture or urban livestock is one strategy to lower greenhouse gas emissions and enhance the quality of the air in urban areas. Local food is accessible, and there is open green space thanks to urban farming. By producing local food and greening the urban environment, urban farming also contributes to its improvement. This demonstrates how urban farming lowers transportation-related carbon emissions by using less energy to move food.

### B. *Impact Application Urban Farming in Region Urban to Food Security*

Food security is essentially "the condition of food fulfillment for the country and individuals, which is reflected in the availability of sufficient food, both in quantity and quality, that is safe, diverse, nutritious, equitable, and affordable, and that does

not conflict with the religion, beliefs, and culture of the community, to be able to live a healthy life, be active, and be productive in a sustainable way." [8]. Index resilience food Indonesia in 2022 increase in levels 60.2, go on 1.69% from year 2021.

Based on data from the Global Food Security Index (GFSI), Indonesia's food security index is currently at level 60.4 in 2019 and has only had a 3% correction in the last ten years. Furthermore, data from the Global Food Security Index (GFSI) show that Indonesian food has only had an index resilience correction of more than 3% in the previous ten years; in 2022, the index is expected to reach 60.2, up 1.69% from 2021 [9]. Nonetheless, GFSI believes that the cost of food in Indonesia is very low when compared to other nations. Indonesia's affordability score of 81.4 indicates this, which is significantly higher than the Asia-Pacific average of 73.4. On the other hand, Indonesia's food availability receives a poor rating of 50.9. In addition, only 56.2 is accepted for excellent nutrition, while 46.3 is accepted for adaptation and continuity. Three metrics show that Indonesia's resilience is lower than the average for countries in the Asia-Pacific region.

The production of agricultural commodities is greater than the fulfillment of agricultural commodities. When population growth exceeds food production, a food crisis will occur. Populations in cities are dense, diversified, and heterogeneous, which leads to somewhat complicated social challenges. Social issues, including unemployment, poor health, poor sanitation, malnutrition, and nutritional issues, are prevalent in cities. Urban agriculture that is sustainable could be the answer to this social issue. Direct support of the food security of the household. The issue of insufficient land for farming can be resolved by urban farming. Urban gardening can therefore be employed as a solution to this issue. In addition to addressing the issue of enough food in the face of intense competition for limited resources like land and water, urban farming uses a novel and comprehensive approach that maximizes food access, quantity, and quality for the urban poor. Metropolis. Urban agriculture, or urban agriculture, is an alternative for food security that offers a source of fresh food (edible crops) that can be consumed cheaply for the community, provides employment opportunities that reduce poverty, recycles waste to reduce waste volume, and increases green open space. to reduce the impact of climate change. Many people and various industries are needed in the city, especially community groups that contribute more to family food security.

Urban farming is usually done to increase income or to produce enough food for family consumption and in some places it is done for recreation and relaxation. Because gardening is practiced in constrained spaces, like home gardens, balconies, or roofs, a flexible planting system is used to accommodate the space constraints and optimize the available area for agricultural development. Let's say the plant is situated in a unique area. Vertical gardens employing verticulture and vertical gardening techniques incorporate hydroponic, wall-gardening, and aquaponic planting systems. Urban agriculture is one approach to addressing the issue of food security, and it affects one or more of the following factors:

1) 1) The construction of industrial factories that have an effect on how land or space is used. The area of land utilized for agriculture decreases as a result of increased land usage, as industrial buildings are built on ground that was before used for agriculture.

2) Some Indonesians have moved from farming to working for businesses. This is because there is a chance that a crop will fail and produce no money, even though there is a certain amount that will be received.

3) population growth in cities, particularly as a result of urbanization. Villagers and other rural residents relocate to cities because they see a greater employment market there than in their hometown.

### *C. Ideal Concept for Urban Farming Applications in Urban Areas*

Urban farming is a term for urban agriculture. Urban farming includes animal husbandry, fisheries, agro-forestry and horticulture. Additionally, it can be applied to plantations and rice fields. The process of growing, processing, and distributing agricultural products in urban settings is known as "urban agriculture." It is envisaged that the accessible agricultural land will be useful to city dwellers. Utilizing technology that permits large yields in a restricted area, this must be done cautiously. Vermiculture is one of the contemporary methods that can be applied, along with hydroponics and aeroponics. In general, anyone with basic to advanced technologies can engage in urban farming, depending on their skills. Without a doubt, current technology makes it possible to accomplish exceptional achievements. A prerequisite for productive agriculture is land for food production. Food can be grown anywhere, not just in and around the house. Besides room, media plant Also important, because is media or material place your plants grow. What type of media is used will depend on the type of urban farming being implemented. There are four functions of growing media, namely providing physical support, aeration, water supply, and mineral nutrition.

The city area has enormous agricultural potential for development. The development of urban agriculture can be driven by innovation and local government policies. One of the policies that can be implemented by the government is land and building tax. Satellite imagery technology can be used by tax assessors to replace manual data collection and take pictures of the size of the house, yard, and ground and roof cover. Households that optimize land use for reforestation, including urban agriculture, can receive tax reductions. There are policies that encourage better use of home gardens and grants for green infrastructure and facilities for urban farming enthusiasts.

Urban gardening activities can benefit human psychology in a number of ways, including stress reduction. People who struggle with everyday stress, anxiety, and exhaustion can find physical rehabilitation through gardening. The advantages of nature for societal well-being lead to therapeutic benefits. These consist of contentment, productivity, and self-satisfaction. Humans can benefit from a connection to nature on both a physical and psychological level.

Currently, urban farming can be implemented anywhere (in large or narrow areas), even people who live in apartments can do it. There are several types of urban farming applications based on the planting media and space used, including:

Crops are grown in pots or polybags, which are specialized plastic bags intended for agricultural usage. It can be utilized in small locations because it can be set down on the ground or another level surface. Appropriate mediums include soil, rice husks, compost, manure, or sand.

In cultivation with water media, water will be added with a nutrient solution. It is considered an excellent type for use in limited spaces, so it is suitable for those who live in the city. This method increases the number of plants produced while reducing the area used. This method can also be used in infertile soil. Hydroponics is an agricultural technique that uses water instead of soil for planting. This is a solution for farmers with limited water access or soil conditions that lack nutrients. Hydroponic systems can be used to grow various types of vegetables and fruit.

One urban farming technique that can be used to meet the needs for vegetables in the home is hydroponics. This is an activity that can be done in the backyard of an urban dwelling. With less water and fertilizer, hydroponic gardening methods can produce more food plants while lowering pollution. In this instance, the majority of hydroponically growing individuals use vegetable commodities. The most popular kinds of greens include bok choy, kale, basil, and oregano.

The words "vertical" and "culture" in English are the source of the word "verticulture." Using as many vertical planes as possible allows terraced crops to be grown on narrow land through a technique known as verticulture. Using a verticulture system, plants can be grown in pots, polybags, paralon pipes, old bottles, and tires to lessen the waste issue. Cultivation that is done vertically in a tiered system is known as standing, hanging, wall, or pile verticulture. It is perfect for small spaces because its proportions may be changed to suit your needs or the available space. A variety of plant containers, including pots and polybags, PVC pipes, bamboo, wood, or boards, can be used to construct a building. Two media that can be employed are soil and water.

In verticulture, the media is created in such a way that certain areas can be planted with plants vertically. Different types of plants can be planted at each level, according to desires and needs. In a simpler way, vines can be planted and planted on every wall of a building. Therefore, it will be more practical and have greater use value. In addition, the height of skyscrapers allows for higher agricultural production, which is a method of verticulture. This is the result of increasing media coverage. This multi-storey building can be used in a variety of ways, with each floor being specifically designed to provide a medium for fisheries and plants. For agricultural activities, the top floor of the building can be maximized.

In connection with the problem of air pollution, multi-storey farms can help reduce air pollution because the more plants affect the amount of pollutant gas that can be absorbed, which shows that the more verticulture techniques applied to buildings, the more plants will absorb pollutant gas. Thus, multi-level verticulture techniques can control and reduce air pollution, especially in urban areas.

Aquaponics is something method combine farming \_ system plant vegetables and fish. Because drain water through tank, need sufficient land. \_ For method like here, shelf and pool fish very important. System so -called agriculture aquaponics combine hydroponics and aquaculture with cultivation fisheries. Fish, plants, and bacteria form aquaponics. Plant hydroponics and cultivation fish work the same for help one each other. Water used for cultivation fish works as fertilizer for plant and clean the water so fish can life with good. Kale, bok choy, lettuce, and a number of type fish, like catfish, tilapia, and goldfish, is suitable plants for method this.

Wall Gardening almost The same with verticulture. The difference is wall as a planting medium. Tomatoes, chilies, tubers, and various type plant ornamental is a number of suitable plants \_ For use method this. Because can applied on wall House or page affected back \_ ray sun, method This very easy.

According to Wuryaningsih, planting media is a substance that is used to cultivate plants, allowing the roots or potential roots to spread out and flourish. Plants utilize planting material to sustain themselves as well as to hold their roots in place so that the plant crown can rest securely on it. The absence of pests and disease seeds, the absence of weeds, the capacity to retain water while also removing or draining excess water, the ability to crumble and be porous so that roots can readily pierce the planting medium, and an acidity (pH) of between 6.6 and 6.5 are all necessary for a good planting medium [10].

Apart from media and space, spatial conditions are also important. Since plants need sunlight to grow, the space should be exposed to sunlight. Apart from exposure to sunlight, constant access to water is also important for plant growth as it helps in their growth. Different parts of the house can be used for urban farming practices, such as the front yard, backyard, balcony, rooftop, walls, fence, terrace, hallway, and so on. Different cultivation systems can be used to grow the crops that will be produced.

Urban agriculture, by definition growing food in cities, is one of the keys to developing sustainable food systems in cities that will overcome food security problems. It might be cheaper to buy food from the market if we grow our own food. Food security can be defined as having access to sufficient and safe food that meets the diet and food preferences for an active and healthy life. Additionally, growing our food can increase food security from within the environment or city where we live. Considering Government Regulation No. 68 of 2002 concerning Food Security, the availability of sufficient, safe, affordable and widely

distributed food shows that household food security is met. At least the following three elements must be considered when implementing urban farming: Values ecology that is can make room green Which strategic in region urban areas include:

1) Potential earnings and steady income are two advantages of urban farming from an economic standpoint. Owners of urban farms can utilize the results to quickly obtain more raw materials and make their daily food more affordable by using a variety of approaches. Nevertheless, urban gardening generates income even in cases where the produce cannot be exchanged.

2) Being a source of knowledge is the aim of education. Because they may use this strategy to spend their leisure time at home doing meaningful and productive things, people will be able to stay productive.

3) There is no doubt that daily consumption of food grown in metropolitan areas has a higher health value. Crop quality can be ensured by small-scale farming and strict process control, which includes staying away from pesticides and preservatives. Moreover, farming promotes mental wellness. Farming calms and refreshes the mind.

4) Environmental value: Urban farming provides numerous advantages for the environment, including less stormwater runoff, better urban air quality and temperature, organic pest control, crop preservation, the development of novel crops, and a smaller carbon footprint, according to the Conserve Energy Future website.

#### IV. CONCLUSION

While rapid expansion, particularly in large and densely populated cities, appears to be an "obstacle" because of competing interests, agriculture plays a significant role in sustainable development in Indonesia. The transition of agricultural land from an agricultural to a non-agricultural use has become a "frightening specter" for agriculture in Indonesia. Because there is less rice that can be produced on a large scale and because there is less green space or green places in metropolitan areas, there is a negative impact on food security. Increased urban traffic, industry, and development all contribute to environmental pollution. Air pollution, rising air temperatures, and declining water quality are all impacted by this.

One solution to this problem is urban farming. Urban farming is an idea to overcome problems that exist in urban areas and can be implemented by society, especially in urban areas. Organic farming, which produces vegetables without using chemicals, has the aim of complementing and supporting living creatures by maintaining biodiversity and natural ecological balance. Additionally, urban farming will make the most use of the available land. Recalling the global COVID-19 pandemic of 2020, urban farming gained popularity. This results from the work from home (WFH) policy, which encourages people to spend more time at home and seek out new hobbies to keep themselves entertained. Those who plant exclusively from home can feel more at ease. In addition, they can lessen stress and enhance the quality of the air, which benefits both the environment and their personal health. Urban agriculture, sometimes known as urban farming, can maintain food security and overcome food shortages. They also have the ability to overcome air pollution and overcome food shortages. So the government doesn't need to import food anymore. These urban plants can also reduce air pollution and improve the quality of life. Therefore, we must change the paradigm that we cannot farm in cities, and that farming can only be done in rural areas. As a result, we can not only meet our own food needs, but also help reduce high levels of air pollution, especially in big cities.

Agricultural goods are produced in greater quantities than they are consumed. A food crisis arises when population expansion outpaces food production. Populations in cities are dense, diversified, and heterogeneous, which leads to somewhat complicated social challenges. Social issues, including unemployment, poor health, poor sanitation, malnutrition, and nutritional issues, are prevalent in cities. Urban agriculture that is sustainable could be the answer to this social issue. Direct support of the food security of the household. The issue of insufficient land for farming can be resolved by urban farming. Urban gardening can therefore be employed as a solution to this issue.

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