Your Student Number: _____

The importance of vertical farming in Hong Kong

Hong Kong has a large population but relatively little land and it produces only a small amount of food. Much of the food we eat is imported. (AFCD 2008) This essay will discuss how hydroponic farming systems can be applied in vertical farming, a process of growing food in high rise buildings, and show how this will allow Hong Kong to increase local food production and improve living conditions for Hong Kong people in the future. The first part of this essay will explain hydroponics and outline the key advantages of vertical farming. The second part will discuss how increasing agricultural output in Hong Kong might allow the territory to become more independent and financially secure and at the same time become safer and cleaner.

Hydroponics is the process of growing plants in some form of substrate instead of soil. (Arnold et al. 2009) Two major benefits of hydroponics are that less energy is required for the plant to extract water from the porous substrates and oxygen can be replenished at the same rate that it is used by the plant. (Raviv and Lieth 2008) The forces retaining water are stronger in soil than in substrates and a result the plant has to invest a considerable amount of energy to take up enough water to compensate for the transpiration losses due to the atmospheric demand. "(Raviv and Lieth 2008, p7) Plants grown hydroponically also grow better because of the nature of the macropores which diffuse oxygen at a higher rate eliminating the danger of oxygen deficiency experienced by soil-grown plants. (Raviv and Lieth 2008) It is because of these advantages of substrates over soil that hydroponics allows for more efficient plant growth which makes better use of natural resources.

Note: Should be paraphrased for full points.

Hydroponics does not require soil and uses much less water because it has better hydraulic properties (Raviv and Lieth 2008) which makes it a practical solution in tall buildings which can not hold soil. (Arnold et al. 2009) Vertical farms are high-rise structures in which both hydroponic crops and live animals such as fish and chicken are produced. (Vogel 2008) The superior physical characteristics of hydroponics (Raviv and Lieth 2008) are optimized in vertical farms where each floor will have its own watering and nutrient monitoring systems. (Cooper 2009)

Vertical farming will enable Hong Kong to better supply the basic needs of its population and become less reliant on others. In Hong Kong only 60 square kilometres of land are actively farmed. (AFCD 2008, p1) The territory must import nearly all of its produce because these local farms supply the city with only a small percentage of the fresh produce needed. (AFCD 2008) If vertical farming is introduced to the territory it will enable us to create a far greater portion of our food. The ability to grow its own food through vertical farming will make Hong Kong less dependent upon other countries for basic necessities.

Developing vertical farming in Hong Kong will be economically beneficial because it will generate new jobs and prevent money from being sent outside of the territory. It has been estimated that a 30 story farm on one city block could feed 50,000 people. (Vogel 2008, p752) In 2007 the 3% of agricultural products sold in Hong Kong from local farms were worth over 1 billion Hong Kong dollars. (AFCD 2008) Considering that we have a population of more than six million people, one could calculate that just four or five of these vertical farms could conceivably feed an additional 250,000 people. Moreover, vertical farming could even reduce the amount of garbage and sewage that we pay to dispose of because it could be used for its nutrients. (Vogel, 2008) Not only would less money be sent out of the territory but the construction, maintenance and operations of the vertical farms would create new jobs for local people.

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Growing local food hydroponically through vertical farming will provide the people of Hong Kong with a safer food supply because the production and delivery can be monitored and controlled. Sensors could record and control the types and quantities of nutrients absorbed by each individual plant and systems to monitor plant diseases by employing DNA chip technologies that detect the presence of plant pathogens by simply sampling the air and using snippets from various viral and bacterial infections (Cooper 2009) could be used to ensure healthy crops. There is almost no risk that the food can be contaminated while being transported since it will remain in Hong Kong. The safety benefits of vertical farming also go beyond monitoring produce- at the present time Hong Kong produces less than half of the live poultry consumed (AFCD 2008) and in vertical farms the lower

" (Vogel 2008, p752)

floors would house chickens. This means that we would have a supply of live poultry that is not from farms which might be infected with diseases such as avian influenza. Since these chickens would be raised indoors where it is possible to closely monitor viruses (Cooper 2009) there would be less danger that they could become infected from migrating birds. The degree to which food grown through vertical farming can be controlled and monitored will give the people of Hong Kong greater security.

Produce grown through vertical farming will also contribute to reduced pollution. Since the food does not need to be transported over long distances less pollution will be generated by vehicles involved in the transportation process. The vertical farms could be powered by renewable energy sources (Vogel 2008) to reduce the carbon footprint. Furthermore, the environmental benefits of using vertical farming are not limited to air pollution. Other sources of pollution would be reduced by recycling nutrients such as nitrogen and feeding animal waste to plants within the farms (Vogel 2008). Vertical farming eliminates the waste involved with the production and delivery of food and this will make Hong Kong a cleaner place in the future.

Environmental pollution, global warming and food contamination are all problems that we face in this day and age. Hong Kong is an innovative city with opportunities to develop technologies such as vertical farming to address these problems. Using hydroponics it is possible to grow food more efficiently indoors than on traditional farms and this makes it possible for Hong Kong to become a more self-sufficient, financially healthy and environmentally safe place to be through vertical farming.

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