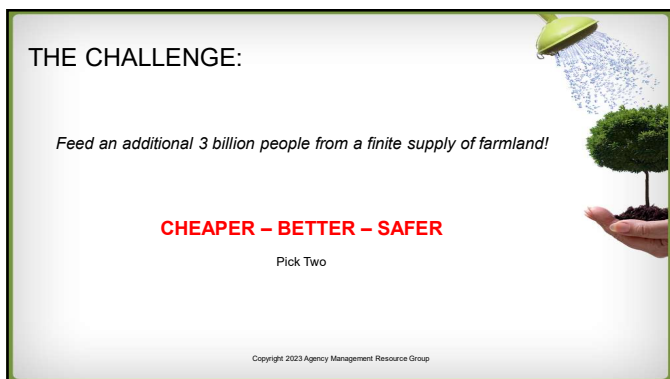




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THE SITUATION

- To feed the current world population of 7.8 billion people, we currently farm a landmass the size of South America
- If the world population reaches 9.7 billion by 2050, and we endeavor to feed each human 1,500 calories per day, we would need to add farmland equal to the size of Brazil
- Currently, nearly half of the population is urban
- By 2050, projections are that two-thirds will be urban

Source: United Nations Population Division

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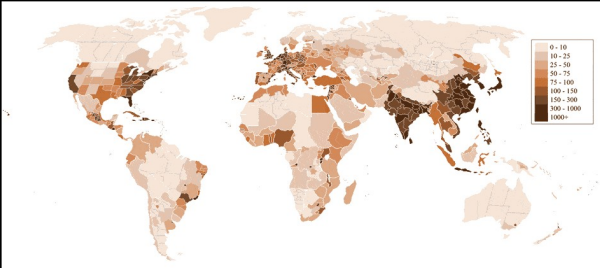


SOME FACTS

- It took all of human history for the world population to reach **1 billion** people, around 1804
- The second billion was achieved in 130 years (1930)
- The third billion was achieved 30 years later (1960)
- The fourth billion occurred in 15 years (1974)
- The fifth billion occurred in 13 years (1987)
- During the 20th century ALONE, world population grew from 1.65 billion to 6 billion
- In 1970, there were roughly half as many people as there are now
- GOOD NEWS – the growth rate is near an historical LOW

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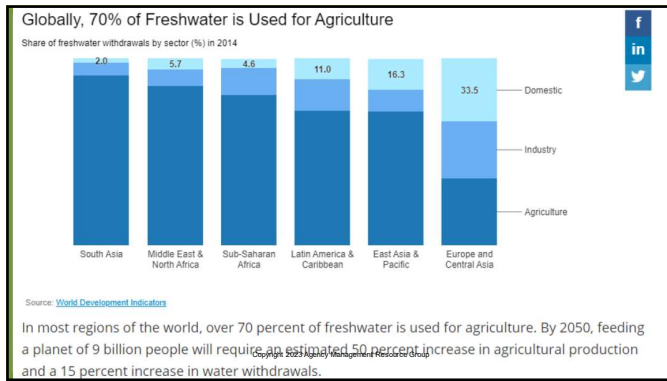
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POPULATION DENSITY

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WASTE NOT, WANT NOT

- According to the USDA, over 50% of all crops planted in the U.S. never reach the plate of a consumer
- Worldwide, it is believed that 70% of planted crops never reach the harvesting stage

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OH FARMER, WHERE ART THOU?

- In the 1930s, 6 million people listed their occupation as farmers (including their immediate families)
- Today, just 1.3% of the U.S. population is employed in farming (around 2.6 million people)
- In the 2020 census, "farmer" probably won't even be listed as an occupation
- Likely, technology and increased productivity leads to less people being needed

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ENTER THE "VERTICAL FARM"

...the practice of growing crops in vertically stacked layers. It incorporates such other practices as Controlled-Environment Agriculture (CEA), which aims to optimize plant growth and soilless farming techniques such as hydroponics, aquaponics and aeroponics.

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TYPES OF VERTICAL FARMS

- Building-based
 - Roof top
 - Side
 - Stand-alone
- Shipping container
- Underground (deep)



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TEN BENEFITS OF VERTICAL FARMING

1. Increased crop yield due to year-round operation
2. No weather-related crop failures
3. No soil erosion or agricultural run-off
4. Minimal need for chemicals (pesticides, herbicides, fertilizers)
5. Reduced need for water (70-95% reduction) and purification
6. Lower transportation costs and less time to market
7. More control of food safety and security
8. New employment opportunities
9. Reduced spoilage and waste
10. Ecosystem restoration

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Increased Yield

-  Not at the mercy of nature
-  Plant any crop, any time, anywhere
-  Take advantage of market conditions – extract the highest price

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No weather-related crop failures

-  Don't have to pray for rain, sunshine, warmth because you control it ALL
-  No floods, droughts, tornadoes, hailstorms, hurricanes or high winds

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No soil erosion or run-off



According to the USDA, "agricultural nonpoint source pollution is the primary cause of pollution in the U.S."



No soil – nothing to erode or degrade



Water is recycled in a closed-loop system



No damage to surrounding ecosystems and industries (e.g., fishing)

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Minimal need for chemicals



NO UNWANTED "DINERS" – INSECTS, MICROBIAL PATHOGENS, ETC.



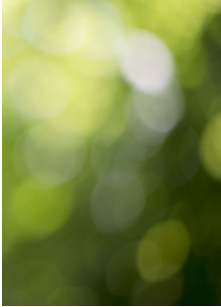
NO WORRY ABOUT E. COLI OR SALMONELLA



A "CLEAN" ENVIRONMENT



PLANTS WILL RECEIVE NUTRIENTS NEEDED BY THE PLANT – AND US



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Reduced need for water and purification



Up to 95% reduction in water use



Water is recycled in a closed-loop system



Grey water can be purified into drinking water

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Less time to market and lower transportation costs

-  Local is what is being demanded by consumers
-  Average trip across the country is 1,500 miles
-  Food begins to degrade the minute it is harvested

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More control of food safety and security

-  The next terrorist threat?
-  Construction can ensure safety
-  Workers will be screened and "cleaned"
-  Outside we control nothing, inside we control everything

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New employment opportunities

-  MANAGERS
-  INDOOR CONTROLLED-AGRICULTURE SPECIALISTS
-  WASTE-TO-ENERGY SPECIALISTS
-  FARMWORKERS FOR PLANTING, MONITORING, HARVESTING, SORTING, SELLING

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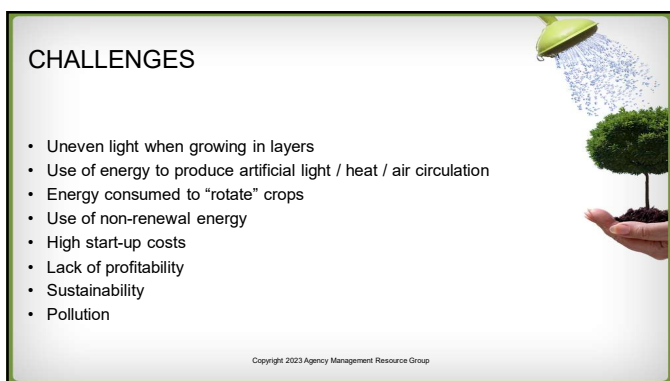
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VERTICAL FARMING METHODS

- Hydroponics

Water-based growing method that does not require the use of traditional soil – nutrients are provided to the plant root system via water

CASE STUDIES
<https://www.youtube.com/watch?v=bRyBKWqLzI8>

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VERTICAL FARMING METHODS

- Aquaponics

Combining hydroponics with raising fish, seafood, poultry and other animals in a "closed-loop" system that is sustainable by both and ecologically balanced

CASE STUDY
<https://www.youtube.com/watch?v=hyLbDOMgtcA>

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VERTICAL FARMING METHODS

- Aeroponics

Nutrients are provided not through water, as in hydroponics, but through air, reducing water consumption by as much as 90% versus traditional farming

CASE STUDY
https://www.youtube.com/watch?v=ME_rprRlmMM

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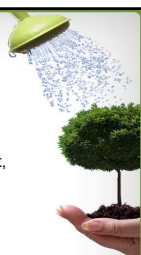
VERTICAL FARMING METHODS

- Controlled-Environment Agriculture (CEA)

Greenhouse-based growing areas that control air, temperature, light, water, humidity, CO2 and plant nutrition

CASE STUDY
<https://www.youtube.com/watch?v=8J03YCoysmc>

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INSURANCE IMPLICATIONS

- Property Coverage
 - Buildings
 - Business Personal Property
 - Business Income and Extra Expense
 - Other
- Liability Coverage
 - Premises
 - Operations
 - Products
 - Product Recall
 - Other

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INSURANCE IMPLICATIONS

- Auto Coverage
 - Liability
 - Physical Damage
- Workers Compensation
- Farm
- Inland Marine
- Environmental
- Professional Liability
- Other

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