

Harvesting Hope

Revolutionizing Farming Practices for
Sustainable Crop Yield Growth

A Data Science Project by Aymen Mohamed





TABLE OF CONTENTS

01

PROBLEM

Explain the underlying situation.

02

OBJECTIVE

How can we address the situation?

03

DATA

Show relevant datasets.

04

ACTIONS

List course of action

05

CONCLUSION

Final remarks and questions.



A watercolor illustration of a globe, with green foliage and blue water. The globe is centered in the background, showing continents in light green and oceans in light blue. In the foreground, there are several branches with green leaves, some of which are partially obscuring the globe. The overall style is soft and artistic, with a focus on nature and environmental themes.

INTRODUCTION

The world is going hungry...



43

countries have alarming or serious levels of hunger

18

countries with moderate, serious, or alarming hunger
levels have higher 2023 GHI scores than 2015

58

countries will fail to reach a low level of hunger by
2030



01

PROBLEM

How can we use machine-learning to effectively implement precision agriculture to cater to impoverished countries?





PRECISION AGRICULTURE

the science of improving crop yields and assisting
management decisions using high technology
sensor and analysis tools.

PROBLEM: “GRAND SCHEME”

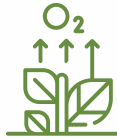
There are a plethora of reasons that can cause humanitarian crises:

- War
- Political Corruption
- Poor Infrastructure
- Change in Environment
- Misinformation in Agric.

For this project we will focus on the last two.



WHY ARE THESE IMPORTANT?



AGRICULTURAL MISINFO.

Are they using their land to the fullest? Are they planting suitable crops? Are they using healthy land? Are they cultivating healthy vegetation?



ENVIRONMENTAL CHANGES

Are they accounting for seasonality? Change in soil composition? Global warming? Changes in arable land quantity?

WHAT WE ARE MEASURING?



CROP YIELD

Does employing precision agriculture affect total crops produced?



GHI METRIC

Will the new amount of crops translate to less instances of hunger? How much?



02

OBJECTIVE

Train model to predict crop yield under the most efficient parameters and see if it effects the 'Global Hunger Index' positively.



WHAT IS WRONG?



LAND USAGE

Suitable land?



CLIMATE

Environmental factors?



FARMING

Proper technique?



CROP SELECTION

Is the crop suited for your situation?



03

DATA

List of all relevant data intended to be used.



DATA: DATASETS



AGRICULTURAL LAND %

SOURCE: Worldbank



GHI

SOURCE: Global Hunger
Index



VHI

SOURCE: FAO



VCI

SOURCE: FAO



GHS

SOURCE: European
Commission



CROP GROWTH

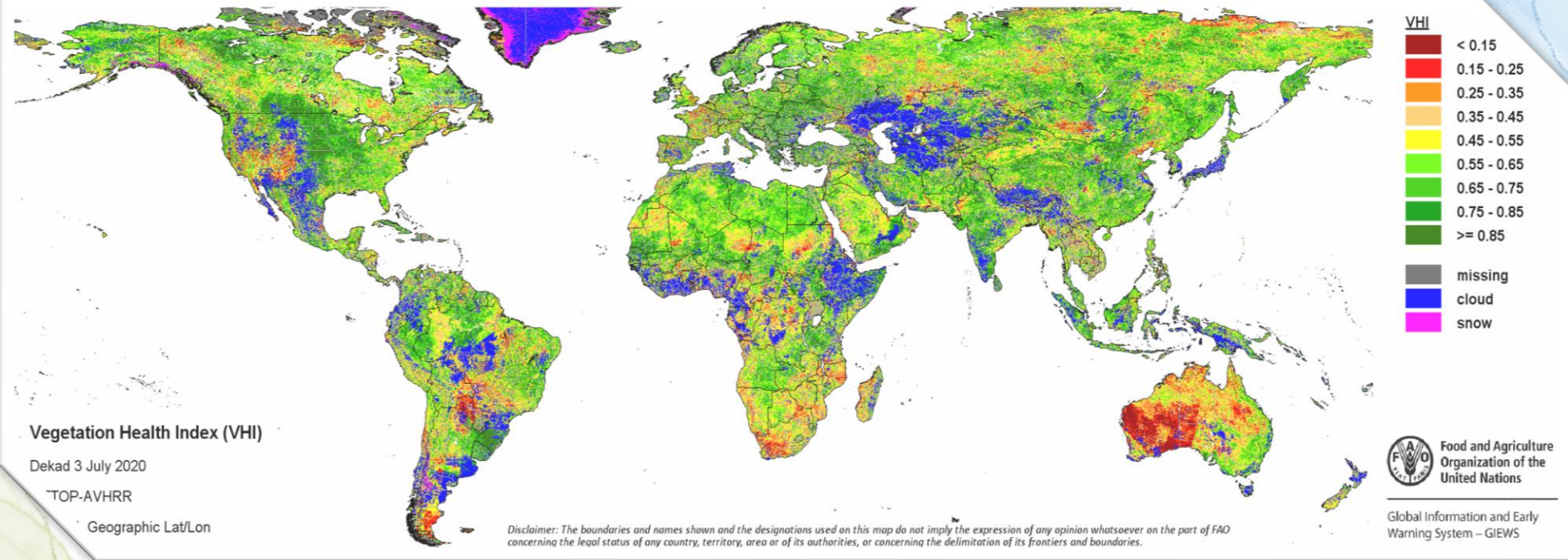
SOURCE: Kaggle (for
now)

GHI: GLOBAL HUNGER INDEX



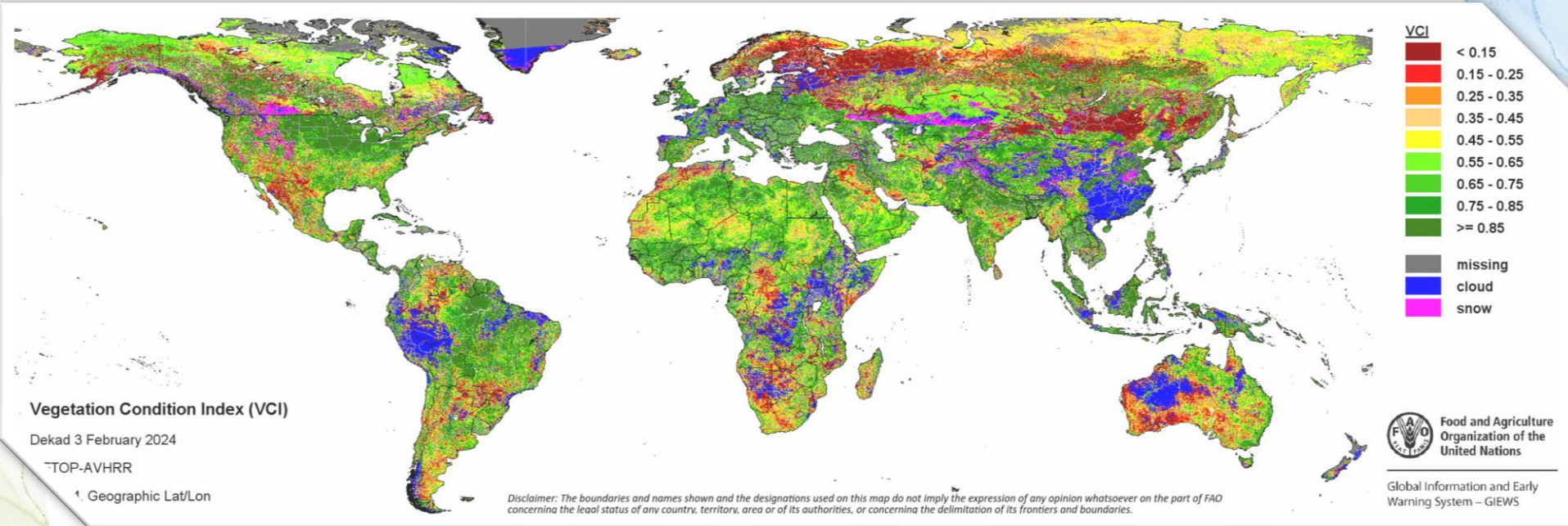
2023.pdf

VHI – VEGETATION HEALTH INDEX



<https://asis.apps.fao.org/pages/non-seasonal-indicators>

VCI – VEGETATION CONDITION INDEX



<https://asis.apps.fao.org/pages/non-seasonal-indicators>

GHS – GLOBAL HUMAN SETTLEMENT

Comprehensive map visualization that includes:

- Populated areas
- Land Breakdowns
- Urban centers
- Breakdown =>

Legend

Degree of Urbanisation

Urban centre (City):

Urban centre (City)

Urban cluster (Town & suburb):

Dense and semi-dense urban cluster (Town)

Suburban or peri-urban cells (Suburb)

Rural grid cells (Rural area):

Rural cluster (Village)

Low density rural grid cells (Dispersed rural area) - transparent

Very low density rural grid cells (Mostly uninhabited area) - transparent

Population

no data (transparent)

0 - 5

6 - 20

21 - 100

101 - 300

301 - 500

501 - 1,000

1,000 - Max

Settlements characteristics

01: open spaces, low vegetation surfaces NDVI <= 0.3

02: open spaces, medium vegetation surfaces 0.3 < NDVI <= 0.5

03: open spaces, high vegetation surfaces NDVI > 0.5

04: open spaces, water surfaces LAND < 0.5

05: open spaces, road surfaces

11: built spaces, residential, building height <= 3m

12: built spaces, residential, 3m < building height <= 6m

13: built spaces, residential, 6m < building height <= 15m

14: built spaces, residential, 15m < building height <= 30m

15: built spaces, residential, building height > 30m

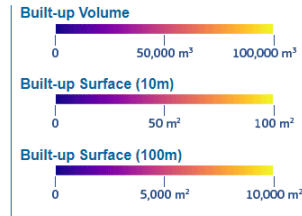
21: built spaces, non-residential, building height <= 3m

22: built spaces, non-residential, 3m < building height <= 6m

23: built spaces, non-residential, 6m < building height <= 15m

24: built spaces, non-residential, 15m < building height <= 30m

25: built spaces, non-residential, building height > 30m





04

ACTIONS

Next steps...



ACTION PLAN:

01



DATA ENGINEERING

Complete data
collection and
concatenation
process

02



LOAD DATA

Clean data and
perform regressions
to establish baseline,

03



ADVANCED MODELING

Incorporate ML
concepts to
prove/disprove
hypothesis

ACTION PLAN:

04



TROUBLESHOOT

Confirm accuracy and
project feasibility

05



VISUALIZE

Create visualizations
and begin sprucing up
presentation

06



FINAL CHECKS

Make sure findings
are presentable and
complete



Conclusion

THANK YOU!!!

ANY QUESTIONS?



“If you can’t feed a
hundred people, feed just
one.”

—MOTHER TERESA
