SEEDING CHANGE

a community garden feasibility study

SUPPLEMENTARY MATERIALS

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UNAM

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Appendix A: Interview Guide for the Preliminary Key Informant Interview

Goal: Gather information about the current working plan for the implementation of the community garden as well as establish expectations.

Type of Sampling: Selective sampling based on sponsor recommendations

1. What is your role at the UNAM School of Medicine?
2. What information do you have concerning the implementation of a community garden here?
3. Could you describe the environment of the UNAM School of Medicine?
    a. What makes you think there is a need for this initiative on campus?
4. Is there a preferred location that has been discussed for the garden?
5. What can you tell me about the soil around the potential garden location?
6. Are there any rainwater collection systems currently in place at UNAM?
    a. If yes: could you tell us a bit more about those systems?
7. What are some staple crops in this area? What kinds of crops would people be most familiar with?
8. From a nutritive perspective, are there any specific plants that would be useful to grow near campus? Are there any nutrients/fiber/etc. that are comparatively deficient in people's diets?

Appendix B: Interview Guide for the UNAM Cafeteria Leaders

Goal: Gather information about food waste and a potential composting initiative for the proposed garden.

Type of Sampling: Selective sampling based on sponsor recommendations.

1. What is your role at the UNAM Cafeteria?
2. What are your responsibilities within this role?
3. How long have you been in this role?
4. To your knowledge, is there a program in place to collect and compost food waste at the cafeteria?
    a. If not: Is this a program that seems feasible at the cafeteria? Why or why not?
5. Do you know how much food is thrown away at the cafeteria?
6. In your opinion, is food waste a problem at the cafeteria?
7. Is there anyone who could take time in order to help with a compost program in any capacity?
    a. If yes: in what capacity?

Appendix C: Guide for Urban Harvest Interview

Goal: To gain information on the feasibility of hydroponics and other growing methods given the circumstances of the UNAM garden site

Rough Outline of Site Info for Unstructured Interview:

1. Access to Water:
    a. Water discharge system but no recollection of using pipes that empty near pervious pavers.
    b. Water is not filtered; it is runoff from the roofs
    c. The team is planning on designing an RHS for the school; this will be our main focus
2. Access to Electricity:
    a. Electricity in buildings is ample
    b. No information about electricity access at the garden site
3. Soil
    a. Likely non-viable, mainly composed of mica
4. Info about students
    a. Extremely busy, 12-hour days
    b. Come from rural backgrounds and do not have knowledge regarding gardening or nutrition
5. Questions for Urban Harvest:
    a. Payment plans
    b. Feasibility of maintenance by students
        i. Sponsors are concerned about long-term maintenance and want this to be relatively easy for the students to participate in
        ii. Also, the site needs to be cleared.

Appendix D: Focus Group Guide for the UNAM Students and Faculty

Goal: Record information regarding student experiences with food insecurity and opinions of campus life.

Type of Sampling: Selective sampling based on sponsor recommendations and available participants.

1. What is it like being a health-professional student?
    a. How do you get to campus? How long is your commute?
    b. Do you feel well-rested and nourished before attending classes?
    c. How do you balance going to campus and your home life?
2. Can you describe life around campus?
    a. Do you find that there are opportunities for student involvement?
    b. What types of activities would you like to see on campus?
4. Would a community garden be a popular activity on campus?
    a. How would you feel about student-maintained gardens?
    b. What types of vegetables would you want to grow?
    c. Do you think this type of initiative would benefit you?
5. What would motivate you to participate in the garden?
6. Do you have any previous experience with gardening?
    a. What would be the most challenging aspect of establishing this garden?
    b. Do you think this initiative would be viable long term?
7. Do you have information on maintaining a garden?
    a. What types of materials would you find helpful to take care of the garden?
    b. How much time would you be willing to dedicate if you are interested in participating?

Appendix E: Verbal Interview Consent Script

As a group of students from Worcester Polytechnic Institute (WPI) in Massachusetts, United States, we would like to invite you to participate in an interview for our research to learn more about the necessary resources for implementing a community garden. The purpose of our research is to provide sustainable activities for students on campus and access to nutritious food that will eventually supply a food pharmacy. The kind of information that we aim to get from the interview is expectations for the community garden, insight into indigenous plants, and student interest and availability. We anticipate that the interview should take about 45 minutes.

This is a collaborative project between the University of Namibia School of Medicine and WPI, and your participation is greatly appreciated. Information from our project will be published in a publicly available academic document at the end of our term, and we can share a copy of our results if you are interested. No names or identifying information will appear in any of the project reports or publications unless you give us consent to do so.

Your participation in this interview is completely voluntary, and you may withdraw at any time. This also means that you can skip any questions that you want. Do you have any questions for us about this interview?

For more information about this research and the rights of research participants, you may contact us by email gr-FoodPharmacyD23@wpi.edu or the Institutional Review Board (IRB) Manager (Ruth McKeogh, Tel. 508-831-6699, Email: irb@wpi.edu) or Human Protection Administrator (Gabriel Johnson, Tel. 508-831-4989, Email: gjohnson@wpi.edu). Thank you very much!

Appendix F: Soil Classification in Namibia

FID	major_soil	associated	included_s	texture	relief___s	Shape__Area	Shape__Length
1	Lithosol, Xerosol				>30%; strongly dissected to mountainous	62799862971	2178900.459
2	Calcic Yermosol		Lithosol, Solonchack	coarse to medium	0-8%; level to gently undulating	60525684.29	47560.34959
3	Eutric Regosol		Takyric Solonchak	coarse	0-30%, level to hilly	6106908267	417530.6752
4	Haplic Xerosol	Eutric Cambisol, Eutric Fluvisol	Eutric Planosol, Eutric Gleysol	coarse to medium	0-8%; level to gently undulating	95989335.47	64775.20609
5	Ferric Luvisol	Arenosol	Xerosol, Eutric Cambisol, Calcic Cambisol	coarse	0-8%; level to gently undulating	880807707.7	278017.9667
6	Cambic Arenosol	Eutric Gleysol	Orthic Ferralsol	coarse	0-8%; level to gently undulating	532083974.9	191645.3329
7	Orthic Solonetz		Cambic Arenosol, Luvic Arenosol	coarse	0-8%; level to gently undulating	19268158744	682313.0407
8	Cambic Arenosol	Albic Arenosol, Calcic Xerosol	Sononchak, Vertisol, Regosol	coarse	0-8%; level to gently undulating	13563542845	587379.9218
9	Calcic Xerosol	Calcic Cambisol, Lithosol	Chromic Luvisol, Cambic Arenosol	medium	0-30%, level to hilly	2.86812E+11	6426229.24
10	Eutric Fluvisol	Eutric Cambisol, Eutric Gleysol	Planosol, Histosol, Calcic Cambisol	medium to fine	0-8%; level to gently undulating	911634543.3	266620.7753
11	Cambic Arenosol	Eutric Gleysol, Podzol	Vertisol, Gleyic Sononetz	coarse	0-8%; level to gently undulating	2097613.171	19382.29227
12	Eutric Fluvisol	Haplic Xerosol, Eutric Planosol	Gleysol, Pellic Vertisol	medium	0-8%; level to gently undulating	10391434.6	19845.76563
13	Cambic Arenosol	Albic Arenosol, Calcic Xerosol	Solonchak, Vertisol, Regosol	coarse	0-8%; level to gently undulating	2.67931E+11	3842749.962
14	Cambic Arenosol	Regosol	Gleysol, Podzol	coarse	0-8%; level to gently undulating	203939920.1	61774.7688
15	Haplic Xerosol		Ferric Luvisol, Arenosol, Orthic Solonchak	coarse to medium	0-8%; level to gently undulating	695408599.9	119077.8109
16	Cambic Arenosol	Eutric Gleysol, Podzol	Vertisol, Gleyic Sononetz	coarse	0-8%; level to gently undulating	16394266073	879395.4324
17	Eutric Fluvisol	Eutric Cambisol, Eutric Gleysol	Planosol, Histosol, Calcic Cambisol	medium to fine	0-8%; level to gently undulating	9238475.294	46032.3433
18	Cambic Arenosol	Eutric Gleysol, Podzol	Vertisol, Gleyic Sononetz	coarse	0-8%; level to gently undulating	4056129.311	28986.21012
19	Eutric Fluvisol	Haplic Xerosol, Eutric Planosol	Gleysol, Pellic Vertisol	medium	0-8%; level to gently undulating	2650650562	818964.5205
20	Eutric Fluvisol	Eutric Cambisol, Eutric Gleysol	Planosol, Histosol, Calcic Cambisol	medium to fine	0-8%; level to gently undulating	132648810.8	83605.20881
21	Eutric Fluvisol	Gleysol	Vertisol, Chromic Luvisol		0-8%; level to gently undulating	2038993738	634862.7409
22	Gypsic Yermosol	Calcic Yermosol		coarse	0-8%; level to gently undulating	47852429704	3204667.853
23				coarse	0-8%; level to gently undulating	1512269.504	7987.637248
24	Eutric Gleysol	Dystric Gleysol, Cambic Arenosol	Dystric Histosol, Humic Podzol	coarse	0-8%; level to gently undulating	602099.7114	5614.559587
25	Eutric Fluvisol	Haplic Xerosol, Eutric Planosol	Gleysol, Pellic Vertisol	medium	0-8%; level to gently undulating	62320930.69	59831.45978
26	Eutric Gleysol	Dystric Gleysol, Cambic Arenosol	Dystric Histosol, Humic Podzol	coarse	0-8%; level to gently undulating	26238032.58	29702.27307
27	Albic Arenosol	Luvic Arenosol	Cambic Arenosol, Calcaric Fluvisol	coarse	0-8%; level to gently undulating	2587311119	231926.6428
28	Eutric Fluvisol		Eutric Gleysol	coarse to medium	0-8%; level to gently undulating	4767517.229	11801.28823
29	Eutric Fluvisol	Haplic Xerosol, Eutric Planosol	Gleysol, Pellic Vertisol	medium	0-8%; level to gently undulating	3698181.992	9616.184185
30	Eutric Regosol		Takyric Solonchak	coarse	0-30%, level to hilly	2159333001	223705.4672
31	Vertic Cambisol		Chromic Vertisol, Eutric Gleysol	medium to fine	8-30%; rolling to hilly	28826083693	1079765.577
32	Gleyic Solonchak	Orthic Solonchak	Albic Arenosol	coarse to medium	0-8%; level to gently undulating	6927067794	425133.0083
33	Lithosol, Xerosol				>30%; strongly dissected to mountainous	3702743859	284840.182
34	Gypsic Yermosol		Calcic Yermosol, Haplic Yermosol, Takyric Solonchak	coarse	0-8%; level to gently undulating	15351015716	1278399.798
35	Cambic Arenosol	Eutric Gleysol	Orthic Ferralsol	coarse	0-8%; level to gently undulating	3169810111	513712.3711
36	Pellic Vertisol	Calcic Cambisol, Chromic Luvisol	Lithosol	medium to fine	8->30%, rolling to mountainous	5153865716	506120.0415
37	Albic Arenosol	Orthic Solonetz	Orthic Solonchak	coarse	0-8%; level to gently undulating	4252126774	335959.4158
38	Lithosol, Xerosol				>30%; strongly dissected to mountainous	5818729948	553925.0683
39	Vertic Cambisol		Chromic Vertisol, Eutric Gleysol	medium to fine	8-30%; rolling to hilly	2343129726	329318.8189
40	Lithosol, Xerosol				>30%; strongly dissected to mountainous	3507590648	387765.5351
41	Cambic Arenosol	Albic Arenosol, Calcic Xerosol	Sononchak, Vertisol, Regosol	coarse	0-8%; level to gently undulating	3126041.189	15951.43287
42	Cambic Arenosol	Eutric Gleysol	Orthic Ferralsol	coarse	0-8%; level to gently undulating	30820187.01	32713.14947
43	Lithosol, Xerosol				>30%; strongly dissected to mountainous	1080860327	130552.6529
44	Lithosol, Xerosol				>30%; strongly dissected to mountainous	1712783483	234512.2868
45	Lithosol, Xerosol				>30%; strongly dissected to mountainous	1655612717	241430.3663
46	Gypsic Yermosol	Calcic Yermosol		coarse	0-8%; level to gently undulating	869157.4971	4359.442319
47	Albic Arenosol	Orthic Solonetz	Orthic Solonchak	coarse	0-8%; level to gently undulating	3951144.986	11729.25267
48	Luvic Arenosol	Chromic Luvisol	Eutric Fluvisol, Pellic Vertisol, Lithosol	coarse	0-8%; level to gently undulating	59028315138	2388965.945
49	Lithosol, Xerosol				>30%; strongly dissected to mountainous	931135339.3	127103.606
50	Eutric Regosol		Takyric Solonchak	coarse	0-30%, level to hilly	40264837825	1710233.398
51	Gypsic Yermosol	Calcic Yermosol		coarse	0-8%; level to gently undulating	29733459206	880848.0069
52	Cambic Arenosol	Lithosol		coarse	0-8%; level to gently undulating	3404676478	340610.1497
53	Lithosol, Xerosol				>30%; strongly dissected to mountainous	5834482580	705058.6141
54	Lithosol, Xerosol				>30%; strongly dissected to mountainous	1579039861	201415.0773
55	Lithosol, Xerosol				>30%; strongly dissected to mountainous	1754624256	264181.4534

Appendix G: Common Food Crops and their Optimal Growing Methods

Useful crops for the cafeteria	Recommended growing method
Carrots	Soil-based
Green beans	Hydroponic bucket system (Bato bucket)
Broccoli	Bato bucket
Cauliflower	Bato bucket
Celery	Traditional hydroponics
Chilies	Bato bucket
Assorted herbs - rocket, rosemary, thyme, etc.	Traditional hydroponics
Kale	Traditional hydroponics
Leeks	Bato bucket
Lettuce	Traditional hydroponics
Peppers	Bato bucket
Cherry tomatoes	Bato bucket

Appendix H: Emerging Themes from Focus Groups with the Peer Student Counselors

Theme	Challenges	Quotation
Community	1. HGC lacks a student community	1. "Or if there are activities, the students don't seem to want to participate or don't have the motivation to participate"
Mixed-Model Gardening .	1. Mostly suited for growing consumable crops in small spaces	1. "So is an advantage of using these kinds of methods to save space?"
Mental Health	1. Mental health among health science students is concerning 2. The resources for mental health are lacking	1. "Our main focus is so we don't want to see students sitting behind buildings crying, instead, we'll be more than happy to see them in the garden." 2. "Yeah, because I know people often go out there to smoke and relax and cry."

Appendix I: Emerging Themes from Interviews with Project Vibe

Theme	Disadvantages	Quotation
Social Participation	1. There are rarely opportunities for students to engage and connect 2. When there are social events, many students do not participate	1. **"**I think the main focus was to encourage social participation or interaction between the different students" 2. "I don't know if you've seen, like, there's not a lot of space for social participation to even happen."
Isolation	1. Health science students do not branch out and talk to people outside of their majors 2. The lack of community has left students feeling segregated and takes a toll on mental health	1. "It's become very, like a life of solitude for a lot of students and they don't want to even try and engage in any sort of social participation." 2. "I think now you can see, like this, sort of like segregation on our campus, like we could work really well with them, but they don't know what we're doing."
Community	1. HGC has lacks a student community 2. Students groups are very segregated	1. "So create a sense of belonging, and ownership, the figure they're doing it themselves." 2. "And it really plays into the need of the community in terms of having to connect with one another."

Appendix J: Emerging Themes from Focus Groups with the First Year Undergraduates

Theme	Disadvantages	Quotation
Isolation	1. First years feel that students do not engage with one another 2. Medical school students have a tendency to self-isolate	1. "It's a bit intimidating also, everyone is on their own, people look so serious, they are hard to approach." 2. "Maybe it's because we are studying medicine. And people are like, so serious about the subject."
Informal Learning Spaces	1. The UNAM campus does not have enough spaces for students	1. "That's the challenge with our campus, like, even South African campuses, usually it's like a student, town like university town. So you can just move like, you can go where you want to, but this is not a very ideal location."
Mental Health	1. Students are overwhelmed and experience burnout	1. "So when I end up here in the morning, I'm usually really tired and that affects how I am especially in the first lectures that we have. So I'm not usually very attentive." 2. "Personally, I feel like there is no balance, because I have to put certain things as priority. So like family life isn't a priority right now studies is"

Appendix K: Fact Sheet on Hydroponics

#1

SEEDING CHANGE

Fact Sheet on Hydroponics

Introduction

Namibia has an arid climate and is prone to dry seasons ranging from June to August. Climate change considerably burdens the country, with mass desertification rendering 92% of the land arid (World Bank, 2021). Windhoek is predicted to have a mean temperature increase of 0.69 °C between 2020 and 2039 (World Bank, 2021), significant for crop yield and groundwater evaporation rates.

The effects of severe droughts and lack of urban agriculture in Namibia have restricted access to food, resulting in staggering household food insecurity rates (Food and Agriculture Organization of the United Nations, n.d.). Most food in Namibia is sourced from mass imports and has become costly. To improve food security, alternative growing methods must be considered. One promising option is hydroponics, a sustainable way of growing crops.

What is Hydroponics?

Hydroponics is a technique by which plant roots are suspended in a nutrient solution, requiring substantially less water and land area for healthy crop growth (Nguyen et al., 2016). These systems save up to 90% water compared to soil-based gardening methods.
There are a variety of hydroponic models, including nutrient film technique, ebb and flow, and deep water culture.

Hydroponics in Namibia

Hydroponics offers farmers in Namibia several advantages, including water conservation, faster growth, and higher yields.

Urban Harvest

A Windhoek-based urban farming initiative that designs, implements and maintains various hydroponics systems around the city.

Figure 2: Hydroponics at Urban Harvest

Ebb and Flow Cycle

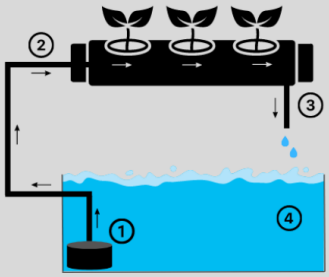

Figure 1: Hydroponics Cycle

1. A nutrient solution is pumped from a reservoir into PVC pipes that hold plant roots.
2. The nutrient solution floods pipes, covering the plant roots and providing them with the necessary nutrients.
3. The nutrient solution runoff is drained from the pipes and back into the reservoir.
4. The cycle repeats, with the nutrient solution pumped into the pipes and then drained.

Deane Spall
Deane is the CEO and co-founder of Urban Harvest

Advantages of Hydroponics

Water Conservation

Hydroponics systems use 90% less water than soil-based gardening methods (Urban Harvest, 2023).

Higher crop yield

A controlled environment optimizes plant growth and nutrient distribution.

Year-round growth

Crops can be grown year-round regardless of climate conditions.

Disadvantages of Hydroponics

High installation cost

The specialized water pumps and electrical components are costly.

Technical Knowledge

Expertise in water pH, plant nutrition, and electrical engineering may be needed.

Water availability

Hydroponic systems need a constant supply of clean water (Niu and Masabni, 2022).

Glossary

Hydroponics
Growing plants using a nutrient-rich water solution instead of soil (Niu & Masabni, 2022).

Nutrient Solution
The water-based mixture of nutrients is used to feed plants in a hydroponic system (Nguyen et al.,2016).

Desertification
Fertile land that becomes increasingly arid-like due to climate change and unsustainable practices

Food Insecurity
The lack of regular access to enough safe and nutritious food for normal development and healthy life to enough safe and nutritious food for normal development and healthy life (Food and Agriculture Organization of the United Nations, 2022).

Ebb and Flow
The method of hydroponics involves periodically flooding plant roots with nutrient solution and draining them away (Niu & Masabni, 2022).

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SEEDING CHANGE

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Appendix L: Fact Sheet on Composting

#2

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Fact Sheet about Composting

What is composting?

Composting is a recycling method to create a fertilizer-rich soil amendment from organic food scraps (Al-Aomar et al., 2022). Composting adds minerals and nutrients to the soil for plant growth and microbiome health. The food scraps and natural waste is broken down aerobically (with oxygen present).

Composting at UNAM:

Where does compost develop?

Compost is held in composting bins or drums. Any bin can be used to hold compost as long as it is rotated or mixed every 3-4 days.

How do you maintain compost?

The main "ingredients" for successful composting include organic matter such as water, oxygen, carbon-rich materials, and nitrogen-rich materials (Cerda et al., 2018). Nitrogen-rich materials include many green plants like grass or food scraps. Carbon-rich materials include things like untreated paper and cardboard.

What are the benefits of composting?

Composting is an eco-friendly and sustainable method of supporting soil health for plants. It is also a productive method of recycling scraps that would otherwise not be used.

An example of a composting system at Urban Harvest in Windhoek.

Contacts/References for Composting:

Sofia Ndokosho:
Sofia is the cafeteria leader on campus and is willing to provide food scraps from cafeteria waste for the compost pile.

- sndokosho@yahoo.com

Below are several sites to consult for starting a compost pile:

- https://www.nrdc.org/stories/composting-101
- https://www.npr.org/2020/04/07/828918397/how-to-compost-at-home

Advantages of Composting

Reduces Waste

Diverts organic waste into nutrients to improve soil fertility (Al-Aomar et al., 2022).

Community Building

Promotes sustainability and shared responsibility (Christie & Waller, 2019).

Soil Fertility

Composting offers a rich source of nutrients and organic matter.

Disadvantages of Composting

Limited to Organic Waste

Only organic matter, such as food scraps and manure, can be used (Cerda et al., 2018).

Attracts Pests

Composting may attract flies and rodents if not properly managed (Christie & Waller, 2019).

Continued Maintenance

Ongoing maintenance is required, including aeration, turning, and monitoring moisture.

Composting

The final product of recycling organic matter to obtain a nutrient-rich soil amendment (Al-Aomar et al., 2022).

Organic Matter

Any material derived from living organisms, including plants and animals.

Nitrogen-Rich Materials

Organic matter such as vegetable scraps and grass clippings. Also known as"green material" (Cerda et al., 2018).

Carbon-Rich Materials

Organic matter such as sticks, dried leaves, and paper. Also known as "brown material" (Cerda et al., 2018).

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Appendix M: Fact Sheet on Rainwater Harvesting Systems

#3

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Fact Sheet about Rainwater Harvesting Systems (RHS)

What are RHS?

Rainwater harvesting systems are systems that collect rainwater to be reused for a variety of purposes (Helmreich & Horn, 2009). This can include collection for gardening and plant use or human consumption. The rainwater collected at the UNAM garden site will be used for plant water and hydroponics to save water and create a sustainable growth cycle.

Rainwater Discharge Pipe

Rainwater Grates

RHS at the University of Namibia

Non-potable water: Not for human consumption

Because there will not be a filtration system in place to make the water safe from contaminations from the roof, the water collected will be used exclusively for the plants.

Where does the RHS tank go on campus?

The tank should be placed in an area with a majority of shade within the garden. It should be connected to the water discharge pipes to collect water directly from the runoff grates (Kakoulas et al., 2022).

Benefits of RHS:

If the water used for cultivation of plants is sourced at the garden, less water waste is possible. Additionally, water that was simply going to discharge into the parking garage can be collected for a purpose.

An example of RHS at Urban Harvest.

Contacts for RHS:

Deane Spall: Hydroponic expert with knowledge about RHS sourcing.

Jojo Drums: A popular brand of rainwater collection tanks

Advantages of RHS

Water Conservation

RHS Systems can collect and store water longer (Urban Harvest, 2023).

Reduced Long-Term Cost

RHS can be used to collect and recycle non-potable water for various purposes.

Drought Resilience

In areas where water is scarce, RHS can help maintain access to non-potable water for household use (Kakoulas et al., 2022).

Disadvantages of RHS

High setup cost

The specialized tanks and filtration systems can be costly.

Maintenance

RHS must constantly be maintained to avoid contamination.

Water Quality

RHS water quality may be compacted by pollution, pests and other biological debris.

Glossary

Rainwater Harvesting
Collecting and storing rainwater for potable or non-potable purposes (Helmreich & Horn, 2009).

Runoff Grates
A drainage system that collects water from paved areas into collection vats or RHS.

Hydroponics
Growing plants using a nutrient-rich water solution instead of soil (Niu & Masabni, 2022).

Filtration System
A system that removes the impurities or contaminants from collected rainwater. These impurities can be biological contaminants or organic matter (Kakoulas et al., 2022).

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Appendix N: Fact Sheet on Mental Health Biomes/Ecosystems

4

SEEDING CHANGE

Fact Sheet on Mental Health Biomes

Introduction

Stress and burnout among health professional students is a universal phenomenon. Many students may experience pressure to excel academically, sleep deprivation, and isolation (Jafari et al., 2012). These factors often lead to consequences that severely impair mental health.

Informal learning spaces are vital to students' mental well-being by providing a sanctuary removed from academia. These spaces provide opportunities for social connection and community engagement (Cox, 2018).

Who we are

Seeding Change, a student-run initiative from Boston, USA, seeks to promote sustainability and mental well-being. We hope to encourage using green spaces in universities to improve mental health, and cognition. Our goal is to inform health-science students of valuable resources for their well-being.

Mental Health Ecosystems

A mental health ecosystem is a metaphor for the various components that allow an individual to thrive. These include individuals, organizations, and systems promoting mental well-being (Furst et al., 2021).

Mental health can be compared to a garden (Lomas & VanderWeele, 2022). Like plants in the arid Namibian soil, plants will not grow without sufficient water and nutrients. These include support from faculty, informal learning spaces, and education on mental health.

The Pillars of the Ecosystem

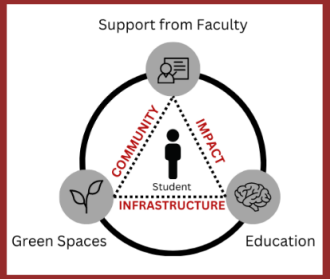

Figure 1: The Pillars of Mental Health

> **Health ecosystems refer to the totality of the circumstances that relate to a given health phenomenon in a defined environment (Furst et al., 2021).**

Green Spaces

One form of informal learning space that would be beneficial to improving mental health is green spaces (Nutsford et al., 2013). These environments include gardens, forests, and natural environments.

Improved Cognition

Green Spaces can help reduce stress and anxiety (Nutsford et al., 2013). They help instill tranquility, improve focus and cognition, and have been linked to increased academic performance.

Community Building

Green Spaces also provide opportunities for social interaction and project ownership. These help establish feelings of belongings within communities (Furst et al., 2021).

Glossary

Mental Health Ecosystem
Collection of resources, individuals, and organizations that work together to improve mental well-being (Furst et al., 2021).

Green Space
Any natural environment, usually in an urban area, that incorporates vegetation and greenery.

Informal Learning Space
An environment where learning occurs in an unstructured setting.

Mental Well-Being
The state of thriving in multiple aspects, including social, physical, and psychological (Lomas & VanderWeele, 2022).

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Appendix O: Library Book Exchange

Appendix P: Plan of Action

Establishment of a Community Garden

The following resource is for use by the University of Namibia student groups or associated parties interested in the development of a community garden at the Hage Geingob campus in Windhoek.

Steps for developing the community garden on campus:

1. Gaining approval from the UNAM Dean of Facilities.
    1. The first step in this garden's development is ensuring there are permissions in place for developing the site. Our sponsoring contact, Dr. Quenton Wessels in the Anatomy department has been working closely with the administration for approval and would have the most current information on approval status.
2. Selecting and obtaining a variety of plants to be grown.
    a. From our conversations with the cafeteria owner Sofia Ndokosho, a large list of commonly used edible crops was developed as follows:
        i. Carrots
        ii. Green beans
        iii. Broccoli
        iv. Cauliflower
        v. Celery
        vi. Chilies
        vii. Assorted herbs - rocket, rosemary, thyme, etc.
        viii. Kale
        ix. Leeks
        x. Lettuce
        xi. Peppers
        xii. Cherry tomatoes
    b. Additionally, it is important to implement a variety of growing methods, with options including hydroponics, Bato buckets, and container gardening. This is both to support the optimal growing conditions of a wider variety of plants in the Namibian climate as well as to incorporate more sustainable methods of utilizing of water and food waste.

Steps for establishing a rainwater harvesting system on campus:

1. The first step in establishing a garden-adjacent rainwater harvesting system is obtaining a large rainwater collection drum. A common brand in Namibia is the Jojo drum which can be obtained from many local

suppliers.

2. Secondly, the water from each of the discharge pipes must be collected and streamlined into one source in order to have it move into the one drum. Oftentimes this is done using PVC piping and a gutter system.
3. Important steps in RHS include ensuring that the system remains closed to prevent mosquitos and ensuring that the tank remains upright.
4. Please see the provided RHS factsheet for further information.

Steps for establishing a composting initiative on campus:

1. It is integral to work closely with the cafeteria and Ms. Ndokosho in the multipurpose center for food waste scraps as that will be the main source of food waste for the compost pile.
2. Additionally, a container is needed for composting and often can be a recycled trash bin or shipping box.
3. Please see the provided composting factsheet for further information.

Appendix Q: Potential Community Green Space Mock-ups

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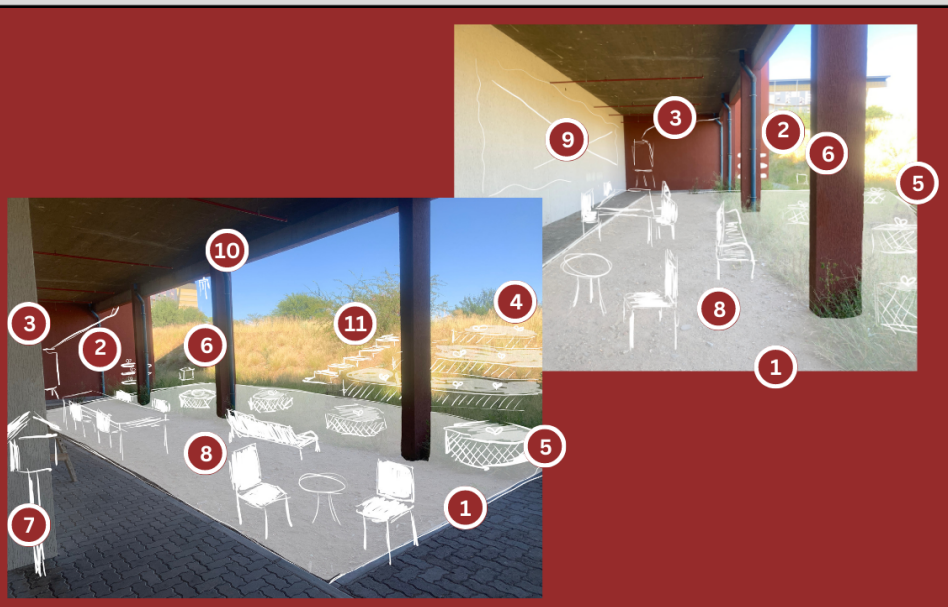
Mock-ups of Potential Community Green Spaces at the UNAM Hage Geingob Campus

Location #1: Lower Balcony, Multipurpose Building

Highlights:

- More isolated, reflective space away from campus commotion
- Potential for soil-based horticultural therapy activities
- Better supports composting (away from major eating areas)



Elements

1. **Paved or mulched site** - to ensure that area remains cleared and usable
2. **Wall-mounted hydroponics** - low-cost PVC pipe system; most successfully supports leafy greens and other similar crops
3. **Rainwater collection drum** - to store directed rainwater discharge from above balcony; may by connected to hydroponics system
4. **Terraced garden** - to cultivate indigenous medicinal plants in native soil
5. **Raised beds** - to grow crops in enriched soil; utilizes tires or other repurposed containers lined with plastic sheeting to minimize nutrient and water loss; alternatively, can install free-standing hydroponic systems
6. **Composting system** - to amend soil for raised bed/container gardening
7. **Community free book exchange** - to promote rest and relaxation, community participation, and time away from academics
8. **Miscellaneous seating** - a variety of chairs, benches, and tables to support social and individual engagement with the space
9. **Mural** - to provide an opportunity for social participation (when painting) and to beautify the space
10. **Wind chimes** - to contribute to a multi-sensory relaxation experience
11. **Optional staircase** - to contribute to the HGC botanical/sensory garden initiative, if it is developed on the land behind the multipurpose center; if not, this feature can be replaced with extended terracing or omitted entirely

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Mock-ups of Potential Community Green Spaces at the UNAM Hage Geingob Campus

Location #2: Upper Balcony, Multipurpose Building

Highlights:

- Extension of existing social space (cafeteria)
- Potential for student meal vouchers in exchange for garden maintenance
- Convenient access to utilities for hydroponic systems, including kitchen greywater

Elements

1. **Bato bucket system** - a type of hydroponic system that incorporates elements of container gardening; supports crops with larger vining/rooting systems including green beans, broccoli, cauliflower, chilies, leeks, peppers, and cherry tomatoes for the cafeteria; railing acts as a trellis
2. **PVC hydroponics system** - either wall-mounted or free-standing; supports leafy greens including herbs, celery, kale, lettuce for the cafeteria
3. **Container gardening** - can be decorative (flowers, etc.) or utilitarian (root crops like carrots for the cafeteria)
4. **Seating** - an extension of indoor cafeteria seating; facilitates outdoor relaxation and social interaction

We intend that these diagrams be referenced for insight and inspiration -- rather than strict adherence -- during future development of this and other similar initiatives.

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Appendix R: Preliminary List of Cultivable Indigenous Medicinal Plants and their Uses

	Plant name	Medicinal Usage
1	Snake Plant (genus *Sansevieria*) – multiple species	Leaves used to treat pain and inflammation
2	Devil's claw	Dried roots used for pain, fever, and inflammation relief
3	Okashila konhoka (Oshiwambo name; scientific name *Xenostegia tridentata*)	Whole plant used in the treatment of headaches
4	Okalyata (local name; scientific name *Dicerocaryum eriocarpum*)	Dried roots used to treat abdominal pain
5	Hoodia	Dried stems used for skin conditioning, to promote weight loss and to control diabetes, high blood pressure, and gout
Note: As many indigenous plant specimens are government-regulated, what is cultivated on campus is heavily dependent on what stakeholders are willing and able to source responsibly.		