e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 6, Issue 12, December 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.54

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54| A Monthly, Peer Reviewed & Referred Journal|

| Volume 6, Issue 12, December 2023 |

| DOI:10.15680/IJMRSET.2023.0612053 |

Permadyanamics: The Food for Next Generation

Dr. E. M. Sunitha[1], B.Santhoshini[2], R. Aishwarya Reddy[3]

Associate Professor, Department of Botany, B.J.R. Government Degree College, Vittalwadi, Narayanguda, Hyderabad, India[1]

BSc Life Sciences, B.J.R. Government Degree College, Vittalwadi, Narayanguda, Hyderabad, India[2, 3]

ABSTRACT: Permaculture is a branch of design science and ecological engineering that focuses on land cultivation, sustainable architecture and designing human systems based on natural ecosystems. Permaculture has the same concept as integrated and organic agriculture, albeit emphasizing on designing and planning to implement sustainable agricultural practices. Permaculture adapted the natural and sustainable designing of soil, water and crops, later merged it with humans' economic and law system. This encourages plant diversity and improves the environment's resilience to the ever-changing climate.

In practice, permaculture highly implements sustainable consumption and production. To rehabilitate unproductive soil, the farmer sow seeds on top of them and cover them up with another pile of soil. To water the plants, farmers use harvested rainwater. Dead plants, cattle manure and household waste are composted into organic fertilizers. Excretion from manure-making will excrete methane gas, which is also being collected to fuel the stove for cooking. Permaculture makes sure that nothing goes to waste, and everything runs in a closed loop.Permaculture is one of organic farming practices, but organic farming isn't necessarily permaculture. permaculture needs to be monitored at times, permaculture isn't natural farming either.

KEYWORDS: permaculture, ecological engineering, sustainable agricultural practices

I. INTRODUCTION

What is Permaculture

Permaculture is a term used to describe an intentional system of agriculture and settlement that aims to reflect the interrelationships and sustainability of natural ecosystems. Permaculture can be seen in contrast to intensive agriculture, which eventually leaves land unfit for farming, gradually reducing the amount of land suitable for human habitation. Permaculture is an attempt to best use land so that generations in the future can continue to make use of the land in productive manners, allowing for personal subsistence or food production

Permaculture Throughout History

Permaculture was coined as a term in the 1970s by David Holmren and Bill Mollison, two Australians dedicated to the sustainable use of land. Although they were the first to use the word, the ideals of permaculture in the modern sense have been around since at least the early part of the 20th century, and the practices that make up the core of permaculture date back thousands of years.

II. MEANING

Permaculture is an approach to agricultural design that focuses on whole systems thinking, as well as using or simulating patterns from nature. Permaculture can be understood as the growth of agricultural ecosystems in a self-sufficient and sustainable way. This form of agriculture draws inspiration from nature to develop synergetic farming systems based on crop diversity, resilience, natural productivity, and sustainability.

Nowadays synonymous with Permanent culture in its broadest sense, permacultureis a global ethic method for designing integrated systems based on the idea of sustainable development. Therefore, human activities must consider natural ecosystems and operate inharmony with them.

1. Permaculture has 3 core tenants:

- Care for the earth. In other words, help all life systems continue to exist and multiply. Because if we don't have a

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54| A Monthly, Peer Reviewed & Referred Journal|

| Volume 6, Issue 12, December 2023 |

| DOI:10.15680/IJMRSET.2023.0612053 |

healthy planet, humans can't exist at all.

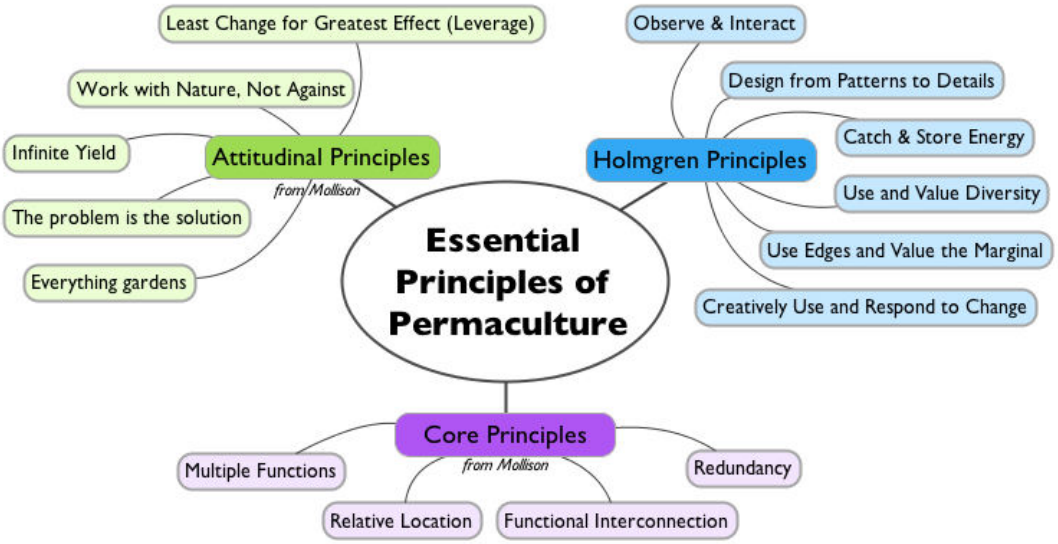
- Care for the people. Allow people to access resources they need to survive.
- Fair share. You should only take what you need, and reinvest any surplus. Any extra can go forward to helping fulfill the two other core tenants. This includes returning waste products back into the system so it can be made useful again.

2. The Principles of Permaculture

- Observe and interact – by taking the time to engage with nature we can design solutions that suit our particular situation
- Catch and store energy – by developing systems that collect resources when they are abundant, we can use them in times of need
- Obtain a yield – ensure that you are getting truly useful rewards as part of the workingyou are doing
- Apply self-regulation and accept feedback – we need to discourage inappropriate activity to ensure that systems can continue to function well
- Use and value renewable resources and services – make the best use of nature's abundance to reduce our consumptive behavior and dependence on non-renewable resources.
- Produce no waste – by valuing and making use of all the resources that are available tous, nothing goes to waste
- Integrate rather than segregate – by putting the right things in the right place, relationships develop between those things and they work together to support each other
- Use and value diversity – diversity reduces vulnerability to a variety of threats and takes advantage of the unique nature of the environment in which it resides

3. The Economics of Permaculture

- Permaculture aims to improve the quality of life, not only for us humans, but also for our flora and fauna. It also aims to make the living conditions for our cattle as natural as possible and factory farming and other practices that imply to raise animals under quite poor conditions should be avoided at all costs.
- The development of community organizations such as SEL (Local Exchange System), generating short circuits, social links, solidarity, and community cohesion
- Permaculture aims to make agricultural processes sustainable in the long run. Yet, thisalso implies that farmers often have to refrain from short-term gains. Moreover, permaculture may also slow down our overall technological progress since it will not support or advocate genetic engineering or other artificial processes in agriculture



| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54| A Monthly, Peer Reviewed & Referred Journal|

| Volume 6, Issue 12, December 2023 |

| DOI:10.15680/IJMRSET.2023.0612053 |

III. HOW TO SET UP A PERMACULTURE FARM IN 9 STEPS

1. Start with Good Maps and an Understanding of Your Local Climate

The most permanent agricultural factor is climate, and it is fundamental to every aspect of your farm. Temperature, insolation, wind, the annual distribution of humidity and rainfall – these are essentially 'the rules of the game', as Darren Doherty would put it.

Geography concerns the location of your farm within the region, shape and form of the land, along with underlying rocks. If climate sets rules for the game, geography is the board on which you play.

These two factors form the environment into which you must place your permaculture farm. These are your design parameters – study them, gather the historical information, observe…

To quickly assess your climate, I recommend looking at the data for your location on the Weatherspark website. Simply enter the nearby town or a city, and you'll get a comprehensive climate report in seconds.

2. Develop Water Supply First

In essence, water and rainfall will determine your permaculture farm's development. The harvesting, storage and distribution of water form the foundation upon which you will build, because all the water lines: diversions, swales, terraces, dams/ponds, channels, will become permanent land features that other infrastructure components will follow. When developing your water systems you will need to consider the storage, harvesting, and reticulation of the available water.

A) Water Storage

You can store water in ponds, dams, tanks, and cisterns. Which option will be feasible for you depends on your needs and the overall volume of water available from the watershed and other sources.

Regardless of the form, from a permaculture perspective, the best location for your water storage will be high in the landscape. To pinpoint if a site like that is available, you'll need to use your topographic maps and analyze the contours.

With your water storage high in the landscape, you can deliver the water to your household or crops via gravity. With some plastic pipes going from the storage to various parts of your farm, you'll create a water network that delivers water for free.

B) Water Harvesting

Once your water storage is ready, you need to develop and expand upon the methods of harvesting the water. Water wells can tap into underground aquifers; however, before going deep use the surface stream flows and rainfall-runoff to fill your water storage.

You can capture water with water harvesting drains that will divert the runoff, streamflow or pumped water into your ponds, and subsequently tanks.

Swales or ditches on contour can also overflow water into your ponds. And once installed, your roads themselves become a very important and efficient water harvesting system.

C) Distribution of water

You should always aim to slow, spread and sink the rainfall you receive evenly across the landscape. This can be achieved by using keyline cultivation, a unique cultivation pattern which is an artificial water line, or by using swales. Both capture water, which then slowly infiltrates and hydrates the landscape.

You can also use gravity-powered irrigation to release the water stored in ponds and water tanks when necessary. The best location for your irrigation reticulation pipes is on ridges because, in this way, you'll achieve maximum coverage of the foothills. Once your irrigation is established, other elements such as farm roads, trees and fencing will follow.

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54| A Monthly, Peer Reviewed & Referred Journal|

| Volume 6, Issue 12, December 2023 |

| DOI:10.15680/IJMRSET.2023.0612053 |

3. Define Access Points

The location of the access points is influenced by climate, land shape, and the water supply network you developed in the previous step. On gentler slopes, the location of the permanent farm roads is more subjective. However, as soon as you get into steeper terrain, the siting of the farm roads is heavily dependant on climate and land shape.

The best location for the main road is on the ridge crests, which divide watersheds – this road will be high and dry, and, most importantly, easy to maintain. Some other potential road locations are along boundary lines and by water channels such as diversion channels, irrigation channels, and irrigation areas.

Farm roads will also change the natural drainage pattern and also serve as hard surface runoff. You'll want to place your roads on the contour to prevent the erosion and concentration of the runoff.

4. Restore Existing Buildings and Introduce New Structures

Now you have dealt with water and access and can move around, you can start the placement of buildings and other structures. In most cases, you'll already have a house with a shed and a yard so you'll first need to retrofit and adapt them to your needs.

When introducing new structures, their placement should follow earlier factors on the keyline scale, as these have already indicated the most suitable locations for the permanent farm buildings. Water supply is determined in relation to land shape and climate, farm roads are guided by the positioning of the water supply, and so on. All of which will disclose the suitable locations for your farm structures, buildings or other elements.

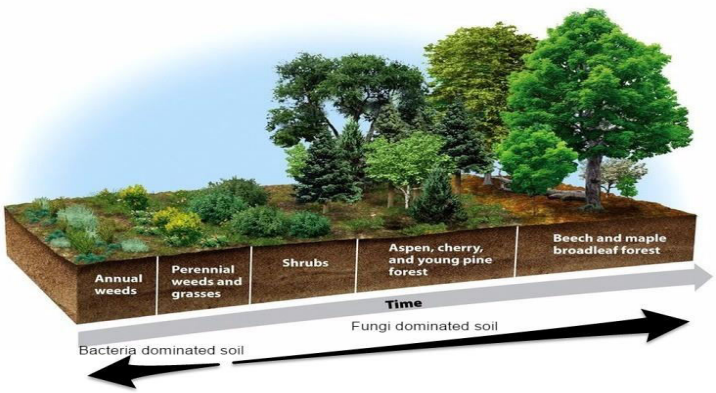
Another aspect to consider at this stage is your energy needs; the generation and storage of that energy. Every household needs energy to provide heat, hot water, and power your electrical devices: i.e. to maintain a basic standard of living. You'll probably require the building or introduction of some energy producing or harvesting structures to fulfil those needs.

5. Subdivide Your Permaculture Farm With Fencing

Fences can be also considered as a part of the infrastructure but they are less permanent than other infrastructure components. Although they come later in the scale of permanence, if you already have an idea where they should go, now's the time to put down your permanent and fixed fencing.

You can consider flexible and mobile fencing later, once the animals are introduced into the system: you should be adaptable to take advantage of different opportunities as they appear. For the moment, just consider the fences that will be a permanent feature of your farm, along with boundaries that will be permanently planted, such as living fences and hedges.

6. Improve Your Soil



Although soil is the last factor in keyline scale of permanence, because poor soil can be quickly changed into fertile soil, it's of primary importance in any agricultural development.

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54| A Monthly, Peer Reviewed & Referred Journal|

| Volume 6, Issue 12, December 2023 |

| DOI:10.15680/IJMRSET.2023.0612053 |

Simple techniques can be used to build soil and you can begin the soil conditioning in the earthworks (infrastructure) stage. This can include keyline ploughing, cover cropping, mulching, erosion control, and even the starting of microbial inoculation through biofertilizers and compost teas.

This is a necessary step prior to planting because it will improve the growth of your plants. Later, when good grazing practices are introduced, subsoil can be transformed into topsoil even more rapidly and you can increase soil fertility with less energy input.

7. Plant Trees and Crops

Now that you've got your soil and water supply ready and ensured an easily accessible property, the next stage is the planting and establishment of the main systems of the farm – savannahs, orchards, woodlots, farm forestry, pastures, market gardens etc.

In most cases, you should begin by establishing windbreaks for the protection of your plantings. Once you have this ready you can start planting trees, woody crops, and annual and perennial plants. In doing so, you might wish to focus on establishing pastures and annual croplands prior to planting tree-based systems. This will provide a source of income and a quick return on your investment in time and money.

In a nutshell, your desired tree density determines which of the tree-based systems you'll adopt. Food forests are denser while savannahs are more open and, for each of these systems, you'll need a different approach. I have previously outlined the approach for establishing a food forest .

8. Introduce Animals

Animals are an integral part of the agricultural enterprise and regenerative ecology. They are key to the maturation of any perennial systems because no ecosystem can reach its full potential without animals. The natural progression is to introduce your animals once you have established your seedling trees. Nonetheless, animals can be introduced at the same time as your plants, although this

You can introduce the big herbivores later and, with good grazing practices such as planned grazing, increase your fertility even further. With properly maintained livestock and living soils, you can complete the cycle and be permanently transforming subsoil into topsoil.

9. Develop Permaculture Farm Economy

Once you got your farm up and running it's time to deal with the financial aspects and expand your influence in the local community.

However, doing this is one thing, and producing a product that the consumer really wants and then delivering it is another. The markets are very dynamic, and are constantly changing and evolving over time. However, the good news is that market analysis, and your access to these markets, are also only a few clicks away. Setting up an e-commerce site such as Shopify and selling directly to a consumer really changes the approach to selling.

The advantages and disadvantages of Permaculture

1) The advantages

- Reduction in waste, the concept of permaculture aims to use our resources in the mostefficient manner.
- Permaculture can help to mitigate soil pollution
- Less air pollution: aims to make agricultural processes more sustainable and to protectour nature whenever possible, it also aims to reduce our emission levels. Through permaculture, less agricultural machines that emit harmful gases into our atmosphere will be used.
- Less groundwater pollution
- Sustainable agricultural concept. Since the concept of permaculture implies using our natural resources as efficiently as possible and also to avoid pollution as best as possible, it can be regarded as a quite sustainable concept. In fact, this attitude towardslife is exactly what we need right now in order to solve our environmental problems.
- Self-production of energy and use of renewable energy sources: the concept implies that farmers also should try to produce their own energy: solar cell, hydropower, etc.

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54| A Monthly, Peer Reviewed & Referred Journal|

| Volume 6, Issue 12, December 2023 |

| DOI:10.15680/IJMRSET.2023.0612053 |

2) Disadvantages

- Implementation of permaculture can be costly in order to adjust agricultural processes and infrastructure in a way that the concept of permaculture can be really lived on a daily basis.
- Short-term losses vs. long-term benefits: permaculture is a long-term game instead of a short-term solution. Even though it makes sense to rely on long-term solutions, it mayalso lead to problems for many farmers since they have to invest significant money andhave to wait an extensive period of time until they see the rewards.
- Famers are not used to it.

IV. CONCLUSION

Permaculture farming, which spread across the West as part of the hippie movement, is fast gaining ground in India among subsistence farmers and those who want to grow their food

REFERENCES

1. Cordell, D.; Drangert, J.-O.; White, S. The story of phosphorus: Global food security and food for thought. *Glob. Environ. Chang.* **2009**, *19*, 292–305. [Google Scholar] [CrossRef]
2. Ferguson, R.S.; Lovell, S.T. Permaculture for agroecology: Design, movement, practice, and worldview. A review. *Agron. Sustain. Dev.* **2014**, *34*, 251–274. [Google Scholar] [CrossRef]
3. Bensin, B.M. *Agroecological Characteristics Description and Classification of the Local Corn Varieties Chorotypes*; Prague, Czech Republic, (Publisher unknown); 1928. [Google Scholar]
4. Bensin, B.M. Possibilities for international cooperation in agroecological. *Int. Rev. Agr. Mo. Bull. Agr. Sci. Pract. (Rome)* **1930**, *21*, 277–284. [Google Scholar]
5. Klages, K.H.W. *Ecological Crop Geography*; The Macmillan Company: New York, NY, USA, 1942. [Google Scholar]
6. Tischler, W. Ergebnisse und und Probleme der Agrarökologie. *Schrift. Landwirtschaft. Fakultät Kiel* **1950**, *3*, 1950. [Google Scholar]
7. Tischler, W. Neue Ergebnisse agrarökologischer Forschung und ihre Bedeutung für den Pflanzenschutz. *Mitteilung. Biol. Zentralanst.* **1953**, *75*, 7–11. [Google Scholar]
8. Tischler, W. Stand und Möglichkeiten agrarökologischer Forschung. *Naturwissenschaft. Rundschau* **1959**, *12*, 291–295. [Google Scholar]
9. Tischler, W. Pflanzenschutz in Nordwestdeutschland aus agrarökologischer Sicht. *Schrift. Landwirtschaft. Fakultät Kiel* **1961**, *28*, 55–70. [Google Scholar]
10. Vogt, G. *Entstehung und Entwicklung des Ökologischen Landbaus im Deutschsprachigen Raum*; Stiftung Ökologie und Landbau: Bad Dürkheim, Germany, 2000. [Google Scholar]
11. Altieri, M.A. Agroecology: A new research and development paradigm for world agriculture. *Agric. Ecosyst. Environ.* **1989**, *27*, 37–46. [Google Scholar] [CrossRef] [Green Version]
12. Callicott, J.B. Agroecology in context. *J. Agric. Ethics* **1988**, *1*, 3–9. [Google Scholar] [CrossRef]
13. Dover, M.J.; Talbot, L.M. *To Feed the Earth: Agro-Ecology for Sustainable Development*; World Resources Inst: Washington, DC, USA, 1987. [Google Scholar]
14. Sillanpää, M.; Vlek, P.L. 6. Micronutrients and the agroecology of tropical and Mediterranean regions. *Fertil. Res.* **1985**, *7*, 151–167. [Google Scholar] [CrossRef]
15. Altieri, M.A. *Agroecology. The Science of Sustainable Agriculture*, 2nd ed.; Westview Press: Boulder, CO, USA, 1995. [Google Scholar]
16. Yunlong, C.; Smit, B. Sustainability in agriculture: A general review. *Agric. Ecosyst. Environ.* **1994**, *49*, 299–307. [Google Scholar] [CrossRef]
17. Rosset, P.; Martinez-Torres, M. La Via Campesina and Agroecology. *La Via Campesina's Open Book Celebrating* **2013**, *20*, 1–22. [Google Scholar]
18. Rosemeyer, M.; Gliessman, S.R. (Eds.) *The Conversion to Sustainable Agriculture: Principles, Processes, and Practices*; CRC Press: Boca Raton, FL, USA, 2010. [Google Scholar]
19. Altieri, M.A. Beyond agroecology: Making sustainable agriculture part of a political agenda. *Am. J. Altern. Agric.* **1988**, *3*, 142–143. [Google Scholar] [CrossRef]
20. Wezel, A.; Bellon, S.; Doré, T.; Francis, C.; Vallod, D.; David, C. Agroecology as a science, a movement and a practice. A review. *Agron. Sustain. Dev.* **2009**, *29*, 503–515. [Google Scholar] [CrossRef]

Impact Factor
7.54

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com