تجربة تلميذ مبدع

Reduce Climate Change

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ملخص:

ناقش هذا المشروع أحد التحديات التي تواجه العالم وهو الحد من تغير المناخ والتكيف معه. لمواجهة هذه التحديات ، كان من الضروري تطبيق نهج عملية التصميم الهندسي (EDP) ، بدأ المشروع بتعريف تغير المناخ ؛ تغير المناخ هو التغير في خصائصه ، ويستمر ذلك لفترة طويلة ، عادة لعقود أو أكثر. قد يكون تغير المناخ بسبب العمليات الداخلية الطبيعية أو التأثير الخارجي مثل تعديل الدورات الشمسية ، والانفجارات البركانية والتغيرات البشرية المستمرة في تكوين الغلاف الجوي أو في استخدام الأراضي. السبب الرئيسي للمناخ هو زيادة كمية ثاني أكسيد الكربون. تم بناء حل هذا التحدي على استخدام نباتات خاصة مثل أزولا لتقليل نسبة ثاني أكسيد الكربون القادمة من المصادر مختلفة على رأسها المصانع، يعتقد الجيولوجيون أن الأزولا ساعد في خفض درجة حرارة الأرض التي استمرت لأكثر من ٥٠ مليون سنة. كانت أزولا السبب الرئيسي لهذا التحول الذي استمر ٨٠٠ ألف عام ، حيث تمتص نباتات الأزولا CO_2 الجوي، وبالتالي خفضت درجة الحرارة العالمية.

Abstract

Today (Egypt) our community faces many challenges like pollution of water, soil and the air, improve uses of technology, improve uses of alternative energies, reduce and adapt to climate change and deal with urban congestion and its sequence. This research discuss one of the challenges that faces Egypt the challenge is reducing and adapting to climate change . To face this challenges it was necessary to apply the

approach of engineering design process (EDP) the definition of engineering design process is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, technology and engineering sciences are applied to optimally convert resources to meet a stated objective. EDP including steps define the problem, gather information ,identify possible solution ,create a porotype ,test, evaluation ,refine and communication. The project started with defining Climate change ;climate change is the changing in its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use . the main cause of climate of climate is raising the amount of carbon dioxide . The solution of this challenge was built upon using plants specially azolla to reduce the percent of carbon dioxide coming from sources of carbon dioxide like factories. Azolla is fern geologists believed that it helped in cool down the warmth earth's temperature which persisted over 50 million years ago. Azolla bloom was the main cause for this transition which lasted for 800,000 years, where the Azolla plants absorbe the atmospheric 〖CO〗_2 making it absent to act as green house, gas and thus decreased the global temperature.

◙ The goal of the project:

The objective of this experiment is to test the efficiency of the azolla plant and sea lentils in absorbing carbon dioxide resulting from environmental, natural and human factors, which causes a change in the weather condition and leads to greenhouse effect and global warming, thus reducing the spread of diseases harmful to humanity and living organisms.

◙ Materials and tools used:

- ☐ Sodium bicarbonate
- ☐ hydrochloric acid
- ☐ carbon dioxide sensor
- ☐ Baker.
- ☐ Glass rod.
- ☐ Gloves .
- Container for Azolla and Lemna gibba .

Procedure:

We are placing a source of carbon dioxide in the glass without placing the azolla or Lemna gibba and leaving it for some time to reach a certain level of concentration of carbon dioxide. The percentage of carbon dioxide gas is less than it was before the azolla plant was placed.

We can summarize our procedure in the following Steps:

Determination of values of Na2Co3 and CO2 (that emitted from the reaction) as follows:

$Na_2Co_3 \longrightarrow CO_2$
$106 \longrightarrow 44$
$15 \longrightarrow ?$

$15 \times 44 \div 106 = 6.2$ gm

$Na_2Co_3 \longrightarrow CO_2$
$106 \longrightarrow 44$
$30 \longrightarrow ?$

$$30 \times 44 \div 106 = 12.5\ gm$$

$Na_2Co_3 \longrightarrow CO_2$
$106 \longrightarrow 44$
$45 \longrightarrow ?$

$$45 \times 44 \div 106 = 18.7\ gm$$

$Na_2Co_3 \longrightarrow CO_2$
$106 \longrightarrow 44$
$60 \longrightarrow ?$

$$60 \times 44 \div 105 = 24.9\ gm$$

Determination of amount of CO2 Before and CO2 After by using CO2 sensor by the time.

Determination of amount of water that supplies our plant (tap water) as follows:

Amount of water = 251 gm

Determination of container height, rediuse, and height of water inside as follows:

1-Rediuse of circular container was = 15 cm.

2- container height = 6 cm

3- Water height inside the container= 2 cm.

4-Determination of suitable amount of Azolla and Lemna gibba (mass in gm) that will cover container enough as follows:

Mass of Azolla or Lemna gibba inside container = 24 gm

Observations:

After using the azolla plant in our experience, we found that it has many benefits, the most important of which is that it quickly absorbs carbon dioxide, and also absorbs or feeds on carbon dioxide in a greater proportion than other plants, so it is useful in maintaining the proportion of this gas in the atmosphere and reduces Its harmful effects on us.

Analysis:

Before putting our plants:

- In case of Lemna gibba:

Table 1 Concentrations of CO2 Before in case of Lemna gibba

No	Na2Co3 (gm)	CO2 reaction (gm)	Sensor (ppm)
1	15	6.22	1532
2	30	12.45	1912
3	45	18.67	2252
4	60	24.90	2572

Note: Atmospheric CO2 = 745 ppm

- After putting our plants:

Table 2 Concentrations of CO_2 Before in case of Azolla.

No	Na2Co3 (gm)	CO2 reaction (gm)	Sensor (ppm)
1	15	6.22	1540
2	30	12.45	1915
3	45	18.67	2240
4	60	24.90	2550

Note: Atmospheric CO_2 = 755 ppm

- After putting our plants:

Table 3 Concentrations of CO_2 after in case of Lemna gibba.

No	Na2Co3 (gm)	CO2 reaction (gm)	Time (min)	Sensor before (ppm)	Sensor After (ppm)
1	15	6.22	10	1532	830
2	30	12.45	11	1912	870
3	45	18.67	13	2252	953
4	60	24.90	16	2572	985

- In case Azolla:

Table 4 Concentrations of CO_2 after in case of Azolla.

No	Na_2Co_3 (gm)	CO_2 reaction (gm)	Time (min)	Sensor before (ppm)	Sensor After (ppm)
1	15	6.22	10	1540	836
2	30	12.45	11	1915	874
3	45	18.67	13	2240	908
4	60	24.90	16	2550	938

Results:

Over time, Azolla plants absorb a large amount of carbon dioxide in a very short time to equalize with the percentage of carbon dioxide in the air.

Conclusion:

Finally, it was concluded from this experiment that the Azolla plant has the ability to absorb a large amount of carbon dioxide compared to other plants.

Social Benefits from Azolla and Lemna gibba:

They are used as a livestock feed and biofertilizer, particularly in rice production. Innovative work is also demonstrating how azolla and Lemna gibba are able to provides a crucial biological link in the development of sustainable, integrated farming practices that are not reliant on chemical fertilizers, but instead use the natural relationship between different species. These include integrated rice-Azolla-duck-fish farming in Japan, and azolla's use as a biofertilizer for coffee and other crops grown in natural 'tree-shade' environments in India's Western Ghats. This produces some of the best coffee in the world and provides natural habitats for wildlife that are increasingly threatened in the nearby UNESCO World

Heritage Site of the Wester Ghats – one of the eight "hottest hotspots" of biological diversity in the world. Azolla's and Lemna gibba's value is slowly being appreciated in the West as a food for people, as a biofuel, as a sequester of the greenhouse gas carbon dioxide, and as a potential source of high-value products including pharmaceuticals, nutraceuticals and bioplastics.

- **Azolla and Lemna gibba as a product:**
- **Using duckweed as livestock:**

Poultry – ducks Ngamsaeng et al. (2004) used freshwater spinach and fresh duckweed in rice diets for Muscovy ducks. There were three treatments: group E1 received water spinach plus broken rice (80:20), group E2 received duckweed plus broken rice (80:20), and group E3 received water spinach and duckweed plus broken rice (35:45:20). Daily weight gain was the lowest in E1 (6.2 g) and the highest in E2 (22.4 g) ducks. Feed conversion ratio was poorer in birds fed E1 and E3 diets (respectively 9.1 g DM/g body weight gain and 4.3 g DM/g body weight gain) compared to these administered E2 diet (3.8 g DM/g body weight gain). The use of duckweed in duck diets was considered advisable.

- **Using duckweed as livestock for: Ruminants**

Huque et al. (1996) studied the use of duckweed as a feed for cattle and determined its chemical composition as well as rate and extent of its digestion in the rumen. They concluded that various types of duckweed (Spirodela, Lemna and Wolffia) differ in the proximate composition. The evaluation of rate and extent of duckweed digestion showed that dry matter and crude protein are highly degradable in the rumen, therefore, further research is needed to assess the level of duckweed supplementation as cattle feed. Damry et al. (2001) fed Merino ewes duckweed to determine its effect on the amount and characteristics of the wool. Sheep were fed oaten chaff in diet C (700 g/animal/day), 630 g oaten chaff and 50 g dried duckweed/animal/day in diet E1, 540 g oaten chaff and 100 g/animal/day dried duckweed in diet E2, and 630 g oaten chaff and 1 kg fresh duckweed in diet E3. Sheep willingly ingested both fresh and dried duckweed, and the analyzed hair coat parameters (wool yield, rate of wool elongation, fiber diameter) did not differ among the groups. In the next trial, oaten chaff-based diets were enriched with urea (control group – C), cottonseed meal (experimental group 1 – E1), and dried duckweed meal (experimental group 2 – E2). In group C, the rate of fiber elongation was slower and wool yield lower than in groups E1 and E2. Fiber diameter was comparable among groups. It has been concluded that duckweed is a valuable source of protein for the ruminants. An experiment with West African dwarf goats (Babayemi et al., 2006) aimed at determining if aquatic plants, such as aquatic fern and duckweed, can be potential sources of protein for the ruminants. In the preference test, goats were more eager to consume both fresh and dried duckweed than aquatic fern. Based on the results of the preference test, the authors conducted a balance trial in the next stage of the research and concluded that fresh duckweed supplementation considerably increased nitrogen retention compared to the control diets based on guinea grass alone. In a study by Reid (2004), Boer goats served as a model for the ruminants. They were fed dried duckweed as a replacement for soybean meal. There were four treatments and the diet for all groups was based on wheat hay, ground maize, and soybean. hulls. Group C0 received no soybean meal, which was fed to animals from group C. Animals from group E1 had access to the feed in which 1/3 of soybean meal was replaced with duckweed. In the experimental group E2, duckweed replaced 2/3 of the soybean meal. No differences were observed among the groups in nitrogen intake and nitrogen excretion, serum urea nitrogen level, and phosphorus intake and phosphorus excretion. Reid (2004) has concluded that duckweed is nutritionally comparable to soybean meal. It had no adverse effects on rumen pH, amount of ammonium ions, and volatile fatty acids.

- **Aquaculture – shrimp**

Flores-Miranda et al. (2014) replaced fish meal with 0%, 3%, 5%, 10% or 15% of fermented duckweed in a diet for Pacific white shrimp (Litopenaeus vannamei), and concluded that duckweed may represent a potential source of protein to shrimps, however it needs to be explicitly confirmed in future research. Consecutive investigations conducted by Flores-Miranda et al. (2015) demonstrated that fish meal replacement with 0%, 5%, 15%, 25% or 35% fermented duck-weed flour had no effect on shrimp survivability in all groups examined, and that the best growth efficiency was achieved in the group fed a diet with 35% inclusion of fermented duckweed flour.

L. gibba was found suitable for incorporation in carp diet up to 20 % level only, with additional dual benefit in terms of feed cost reduction and fish growth enhancement at 10 % level.

- **Problem of water in Egypt:**

Egypt is one of the water scarce countries in the middle-east since the annual per capita share of water had dropped below 1,000 cubic meters. Even though, Egypt has reached a stage of water poverty, with an average yearly water share of 663 cubic meters per capita, and is expected to fall below 582 cubic meters by 2025. Around 70% of the people in rural Egypt has some type of on-site septic tanks of house vaults [1]. The people are emptying their septic tanks into the nearest water bodies. Even many villages have already built an informal or formal sewer system and discharge the collected untreated effluent into the drains. The deterioration of irrigation water quality deprives Egyptian crops of competitive opportunities in the global markets. The water pollution and its scarcity are the main challenge to the Egyptian government to secure food and water for the rapidly growing population. The Egyptian government has committed itself to reduce poverty and secure food for rural people.

- **Solution of the problem:**

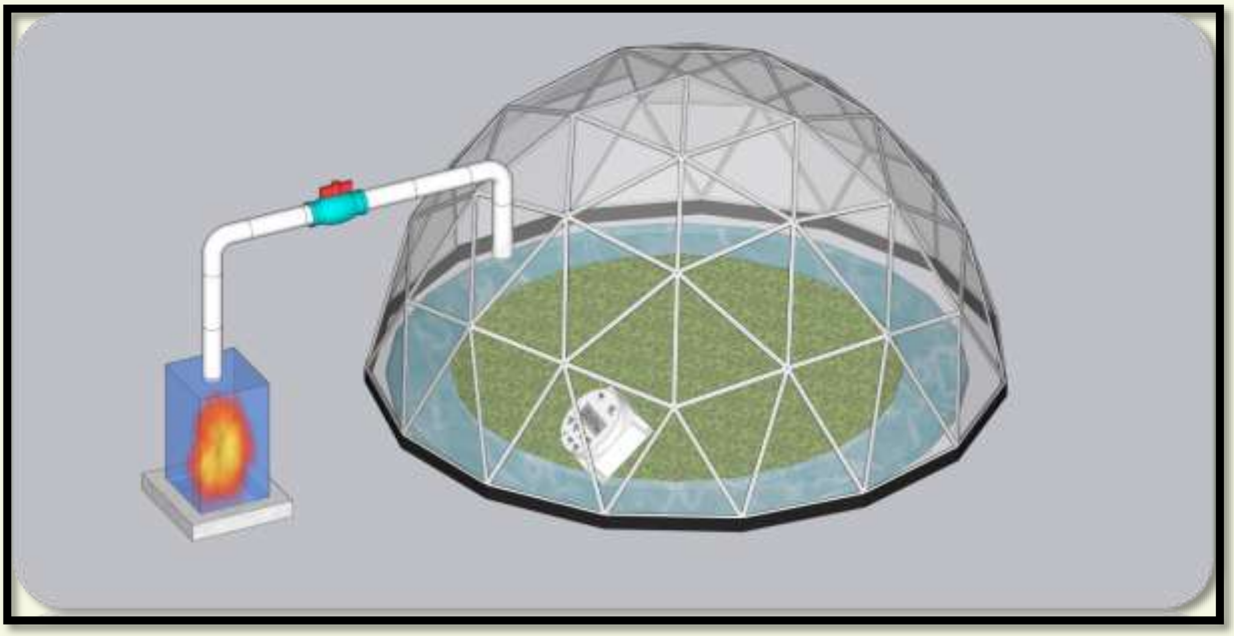
Reuse of the drainage water and treated sewage in irrigation was officially approved and documented in the water resource management plan (2017-2037). Reuse of the treated effluent is one of the solutions to overcome economic constrains and enhance cost recovery for sanitation services in rural Egypt.

Sustainable development of animal, poultry and fish production sectors could be achieved by affording low cost feed. Aquatic plants that have high uptake rates and contain considerable amount of protein, represent alternatives for imported fish feed ingredients. The imported feed ingredients have been accounted for 99% of soybean cake, 97% of soybean seeds and 50% of maize consumed in Egypt. The duckweed plant has been investigated for nutrients recovery and biomass production using municipal sewage and swine wastewater .

The duckweed biomass has been used solely as fish feed for tilapia in duckweed/tilapia production system using municipal sewage. It has also been used as a feed ingredient up to 40% without considerable negative impacts on growth performance of Nile tilapia in intensive production systems. The Azolla cultivation practice is going to be widely considered as low cost cattle feed by dairy farmers. The potential of duckweed (Lemna gibba) and water fern (Azolla filiculoides) for nutrients recovery and biomass production was explored in this study.

- **Prototype is consists of:** ☐

- Source of CO2.
- Gas tube.
- Gas valve.
- Greenhouse.
- Azolla plant .
- CO2 Sensor



- References
- challenges

.Caves, R. W. 2004, Encyclopedia of the City. Routledge. p. 141

Dina Bisaaaa. Renewable Energy, 2020, International Trade Administration. www.trade.gov

Medhat Mohsen, 2019, Student Counselor at Mariya International .Schools-, STEM Education: Egypt Grand Challenges

Renewable Energy Targets, ministry of electricity and renewable energy. http://nrea.gov.eg

- Climate change

Hassan M. Heshmati ,2020,Environmental Change and Sustainability,Chapter :Impact of Climate Change on Life.

Nsikak Benson,2008,ENCYCLOPEDIA OF Global Warming and Climate Change, p(212-213),Climate Change, Effects.

Nwoke, B. E. B1., Nwoke, E. A2 and Ukpai, O.M3,2010,EFFECT OF CLIMATE CHANGE ON HUMAN HEALTH AND SOME ADAPTIVE STRATEGIES – A REVIEW,Bayero Journal of Pure and Applied Sciences, 2(1):168 – 172

- **Solutions:**

Andrew Glikson: Carbon dioxide might fertilise plants, but they still need water, Published: July 4, 2013

Busman J.S. & Belen C. (Last Updated 26, October 2008) Important Components of Ozone. Retrieved November 20, 2008

Dave Huebert, 2015. Water Plants 101: A basic introduction to the physiology and ecology of aquatic plants.

Go Green Initiative; https://www.presidency.eg

Green choice; 2018; Philippine Center for Environmental Protection and Sustainable Development, INC (PCEPSDI(

Jimit Shah,2019,Climate Change : Challenges and Solutions

Kumar U and Nayak AK (2019) Azolla Germplasms at NRRI: Conservation, Characterization and Utilization. NRRI Research Bulletin No. 19, ICAR- National Rice Research Institute, Cuttack -753006, Odisha, India, pp1,59, 68.

Pedersen, Ole; Colmer, Timothy David; Sand-Jensen, Kaj (2013). "Underwater Photosynthesis of Submerged Plants – Recent Advances and Methods"

Preethy Thangaraj, Eric lam, gal Hochman, 2018,factsheet: duckweed asbiomasshttps://www.usda.gov/sites/default/files/documents/duckweed_factsheet.pdf.

Sally Hladyz1,2, Kajsa A˚ bjo¨rnsson3 , Paul S. Giller1 and Guy Woodward1,4: Journal of Applied Ecology 2011, Impacts of an aggressive riparian invader on community structure and ecosystem functioning in stream food webs.

Samanthi: 2018, Difference Between Land Plants and Water Plant

Ikram M. Ahmed 1*; Sofyan M. Saad 1; Elaf Y. Abd Alteef 1; White Mogahed A. Suliman 1; Talal M. Mustafa,2021,” A new record for the invasive aquatic fern Azolla filiculoides Lam. in the Nile, Sudan” E-NAMTILA Publishing .pp 19,20,21.

Elsayed M. Ali Nafea (2016): Characterization of environmental conditions required for production of livestock and fish fodder from duckweed (Lemna gibba L.). Journal of Mediterranean Ecology. vol. 14: 5-11 ,8.

Henk van den Berg - Erik van Lidth de Jeude –Arne Hak - Caro Mooren –Ruben Leen den Uijl –Tatiyana Giomi –Sebastiaan Kraaijeveld 2015 ” Duckweed, a tiny aquatic plant with growing potential” p18.

Lili Fu1, Meng Huang1, Bingying Han1, Xuepiao Sun1, K. Sowjanya Sree2, Klaus-J. Appenroth3 & Jiaming Zhang1, 2017, “Flower induction, microscopeaided cross-pollination, and seed production in the duckweed .Lemna gibba with discovery of a malesterile clone”. .scientific reports.p2

YULI ANDRIANI1, BUDI IRAWAN2, ISKANDAR1, ,IRFAN ZIDNI3, RUHYAT PARTASASMITA2:” Short Communication: Diversity of duckweed (Araceae-Lemnoideae), morphological characteristics and its potentials as food sources for herbivorous fishes in West Java, Indonesia” . B IOD I V E R S I T A S . DOI: 10.13057/biodiv/d200618 .2019.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