

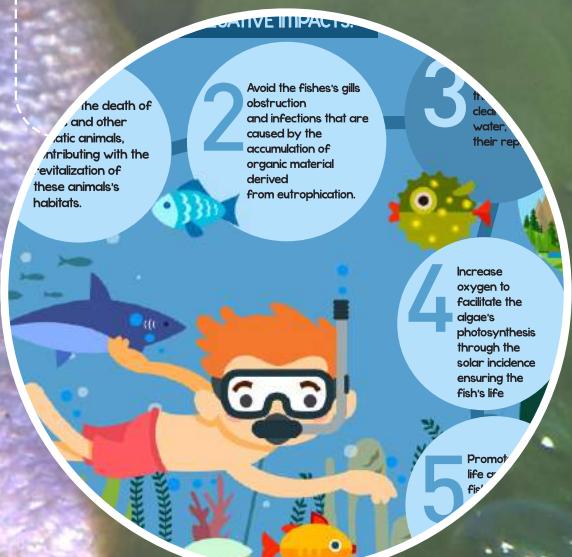
RESEARCH PORTFOLIO



BOLMORINGA PROJECT

The efficient solution for
FISH DEATH

As one of the greatest environmental problems of the century, EUTROPHICATION has killed hundreds of hundreds of fish and other aquatic animals around the world.



GAMETECH
Team 1000



GAMETECH

We are the Brazilian team Gametech, founded in October of 2014. Our city, Goiânia, is located in the State of Goiás, considered the heart of Brazil! It is a place of a cozy, happy and contagious people. We study in the Sesi/Senai Vila Canaã, where we attend the High School jointly to a Technical Course. In our school there are three technical courses: Aliments, Mechanic and Graphic Processes; our team has members of all these areas! That help us a lot because everybody contributes to the team evolution. Those ones of Graphic Processes support the others individuals to infographics and portfolios arts devising. Besides that, they help in the Core Values interactions through social medias campaigns. The members of Mechanic help us to create and understand our robot mechanisms and programming. Members of the Aliments course assist the team in laboratory studies to test the efficiency of our solution. Our individuality makes each one of Gametech to take care of the group in an own way, because "We are a team".

For us, it is a great joy to participate in this tournament, regardless of Awards! Our experiences in robotics have been helping us to grow up as great citizens. That is because we know "What we discover is more important than what we win!".

We want to enjoy a lot and contribute making it a Fantastic tournament! We want to make friends and learn with them. We also want "to share our experiences with everyone", because we know that together we can spread with the people of the world the fantastic values of FLL.

An animation cry that we use says: Gametech here arrives, with the blue that catches you up... we hope to catch you up, to contaminate everyone with all the energy of the Brazilian people and with the desire to make a better world, for men and animals. All of these encourage us to say one last thing: We will have fun a lot!



GOIÂNIA



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4 RESEARCH PROCESS

1 - We identify the problem

2 - We look for different sources of information

3 - We analyze the problem

4 - We review existing solutions

5 - We formulate our solution



FINDING THE SOLUTION

BRAINSTORMING



DIALETIC METHOD



CANVAS



EXPERIMENTAL RESEARCH



BIBLIOGRAPHIC RESEARCH



PROBLEM IDENTIFICATION:

5

How can we reduce the mortality of fish and other animals in the water caused by eutrophication?

In Serra da Mesa lake in Goiás 100 tons of fish died in a SINGLE month due to eutrophication.¹

(Diário de Goiás, February 2016.)

About one ton of dead fish were collected from the Jacarepaguá Lagoon.²

(EBC, September 2015.)

In the Araquá and Pardo rivers in São Paulo, 260 tons of fish died in 2011, due to eutrophication.³

(Folha de São Paulo)

Thousands of dead fish clogged the surface of the Shinnecock canal in Southampton, New York. Due to lack of oxygen caused by eutrophication.⁴

(The Guardian, November 2016)

In 2009 approximately 65 tons of fish died Dunkard Creek, a river that runs through West Virginia and southwestern Pennsylvania. By the disposal of industrial waste that caused the flowering of algae.⁵

(Earth Island Journal)

GOALS

REDUCE THE MORTALITY OF AQUATIC ANIMALS AND THEIR RESPECTIVES NEGATIVE IMPACTS.

1 Prevent the death of fishes and other aquatic animals, contributing with the revitalization of these animals's habitats.

2 Avoid the fishes's gills obstruction and infections that are caused by the accumulation of organic material derived from eutrophication.

3 Improve the fishes's sight through the cleansing of the water, facilitating their reproduction.

4 Increase oxygen to facilitate the algae's photosynthesis through the solar incidence ensuring the fish's life

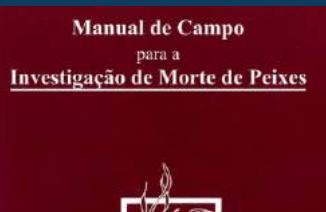
5 Promote better life quality for fishes, amphibious and other aquatic animals



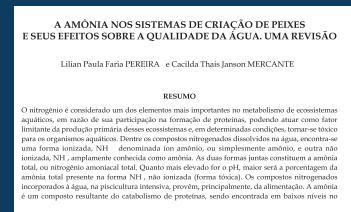
SOURCES OF INFORMATION

7

SCIENTIFIC ARTICLES



CEMIG FISH MANUAL



INSTITUTE OF FISHERIES OF SP



RENEFARA

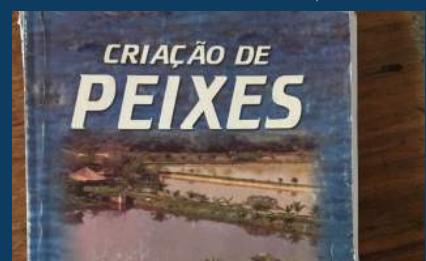
ENCYCLOPEDIAS



planeta Terra
encyclopédia
de ecologia



New World Encyclopedia



FISH BREEDING BOOK



MAGAZINES



VEJA



VERDE



SCIENCE



SCIENTIFIC AMERICAN

PANORAMA DA AQUICULTURA

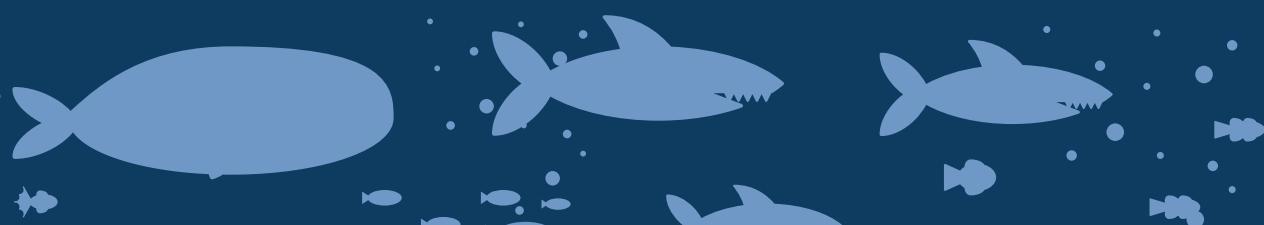
THESES OF UNIVERSITIES

UNIVERSITY
OF GOTHEMBERG

UNICAMP



UNAERP



SPECIALISTS



BIOLOGIST DR. GEORGIAN



CONSULTING WITH 3M
ACCOUNTING OFFICE



CONSULTATION WITH
BIOTECHNOLOGIST
CAROLINE SALVATI



THIAGO SILVA ENVIRONMENTAL
ENGINEER



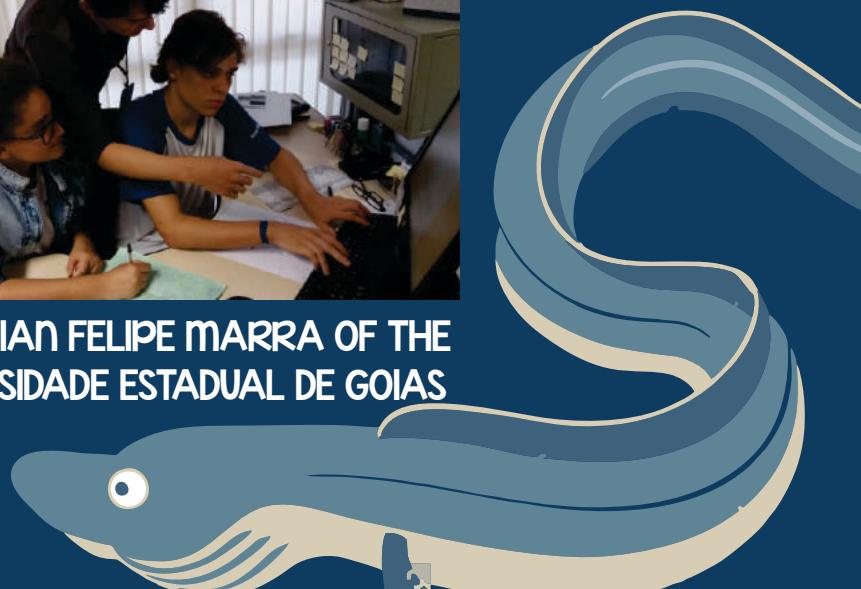
POLICE
VETERINARIAN



TRADEMARK SEARCH



LIBRARIAN FELIPE MARRA OF THE
UNIVERSIDADE ESTADUAL DE GOIAS



10

TECHNICAL VISIT TO ETA (Station of Water Treatment)



VISIT TO ETA

WATER TREATMENT COMPANY WEBSITE



WATER TREATMENT

- Home
- Turkey plants
- Containerized plants
- About Lenntech
- Applications
- Processes
- Systems
- Products
- Industries
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- Calculators
- Reference projects
- Lenntech News

Request a quote

Phone: +31 152 610 900
info@lenntech.com

LENNTech

Possible solutions for the problem of water bodies eutrophication

The eutrophication problem can be solved reducing the external load of nutrients or directly manipulating the water body ecosystem. Different solutions for the problem of eutrophication are being analyzed or are already applied. A list of the most popular follows. For a detailed description click on the solution you are interested in.

- nutrients limitation
- algae filtration
- ultrasonic irradiation ->AL_50
- AL 50 D
- AL 20
- AL 18
- AL 5
- others

Related topics

- Algae description and types
- Eutrophication
- Sources
- Effects
- Solutions
- Conclusions
- References

ARTICLE OF THE COMPANY LENNTECH



DECLARATION OF SUPPORT OF PROJECT

I, Thiago Santos Freitas, Environmental Engineer And Of Work Security, Especialist In Treatment And Disposal Of Solid Debris And Fluids At The Goiás Federal University (UFG), Written On ID Card: 5022824, Declare, The Comprovation Certify That I Did The Supervisor And Applicability Of Bolmoringa Project, Made Up By The Robotic Team GAMETECH CANAÃ To Participat Of FIRST LEGO LEAGUE Tournament.

Goiânia, December 7, 2016.

Thiago Santos Freitas
Thiago Santos Freitas

Environmental And Security of Work Engineer
CREA. 1014741378 AP-GO



*Iniciativa da CNI - Confederação
Nacional da Indústria*

Goiânia, July 1st , 2017.

Me, Lydia Tavares de Araujo Andrade, owner of the following CPF (Physical Person Register): 700.805.341-04 and the id card: 4197339 SSP/GO, instructor in professional education at SESI Senai Vila Canaã school. I declare for the proper purposes that the realization of the analytical test under my supervision, aiming the phosphate compost determination in different concentrations (4, 8, 12, 16, 20 mg/L) and in different collecting time for the analysis (30, 60, 120, 180 mg/L) according the datas below:

**TIME OF TESTS WITH PHOSPHATE CONCENTRATION AND MORINGA
OLEIFERA ACTION**

PO₄²⁻ Concentration	Change in concentration at mg/L of phosphate according the time augment (min)			
	30	60	120	180
4 mg/L	3,51	2,95	2,41	2,17
8 mg/L	6,53	5,59	5,46	5,20
12 mg/L	9,47	6,03	5,36	4,67
16 mg/L	8,88	7,89	7,64	7,51
20 mg/L	12,43	8,85	8,05	7,81

Lydia Tavares de Araújo Andrade
CPF: 700.805.341-04
Instrutora de Educação Profissional
Escola SENAI Vila Canaã

Lydia Tavares de Araújo Andrade

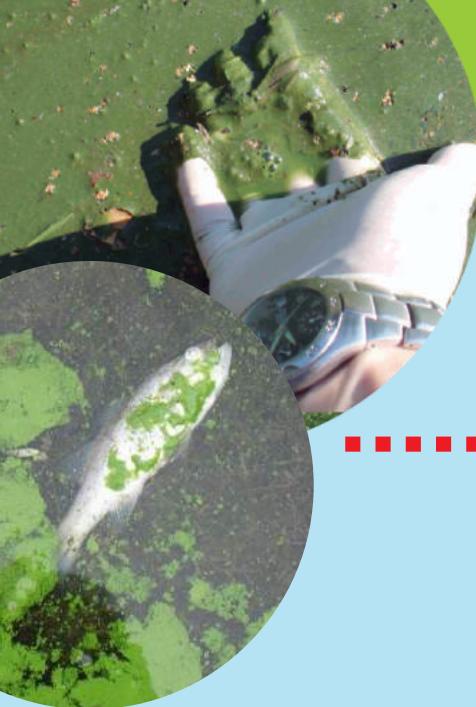
Lydia Tavares de Araujo Andrade

Goiânia, June 1st, 2017

PROBLEM ANALYSIS

Why are FISH dying?¹²

13



Fishes are dying due the
EUTROPHICATION process!!!

SUN

And how does it occur?

Over the water are deposited
detrites, containing Nitrogen
(N) and Phosphorus (P),
deriving from:

- Unconscious discard sewer
- River bank erosions.¹³

Many algaes appear on the
surface hence, stoping the
photosynthesis process.

At the same time, many
bacterias and cyanbacterias
start to proliferate.



Starting a biologic
disput by Oxygen (O₂),
KILLING several FISHES
by asphyxia!!!!



Besides the asphyxia, bacterias and
cyanbacterias release toxins even
stronger when in eutrophicated
environments, contaminating the water
and killing fishes by intoxication.¹⁴



PROBLEM ANALYSIS

Fishes are mainly exposed by EUTROPHICATION in their gill respiration, blood circulation and reproductive process.

Understand how fish are suffering with eutrophication hereafter:

1

Deregulation of sodium and glucose plasma from fish reduce the immunity and physical quality of the fish⁶

2

Obstruction of the gills caused by organic waste induces asphyxia⁷

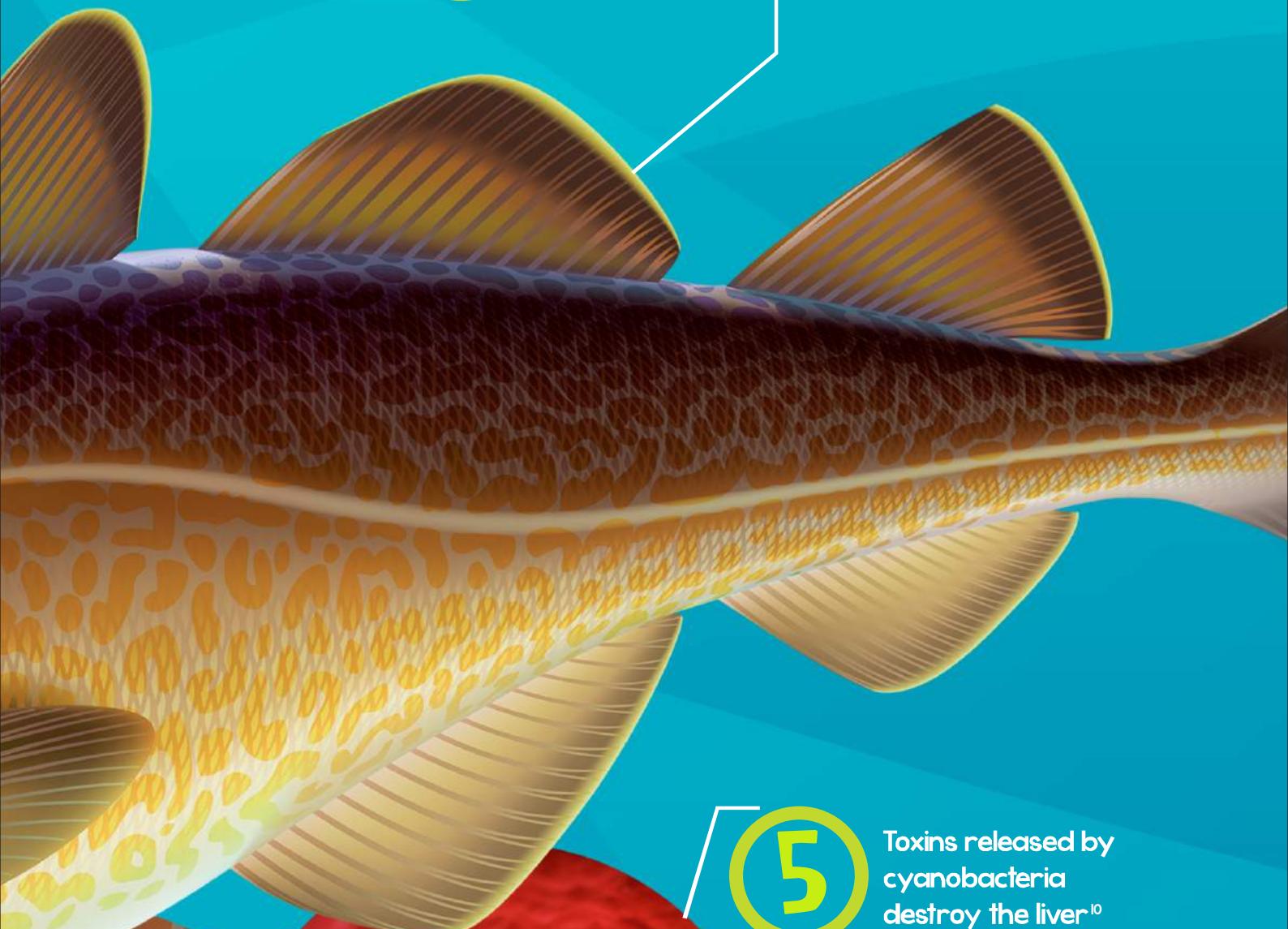
3

It interferes in the fish reproduction and affects genetic variability and species perpetuation⁸



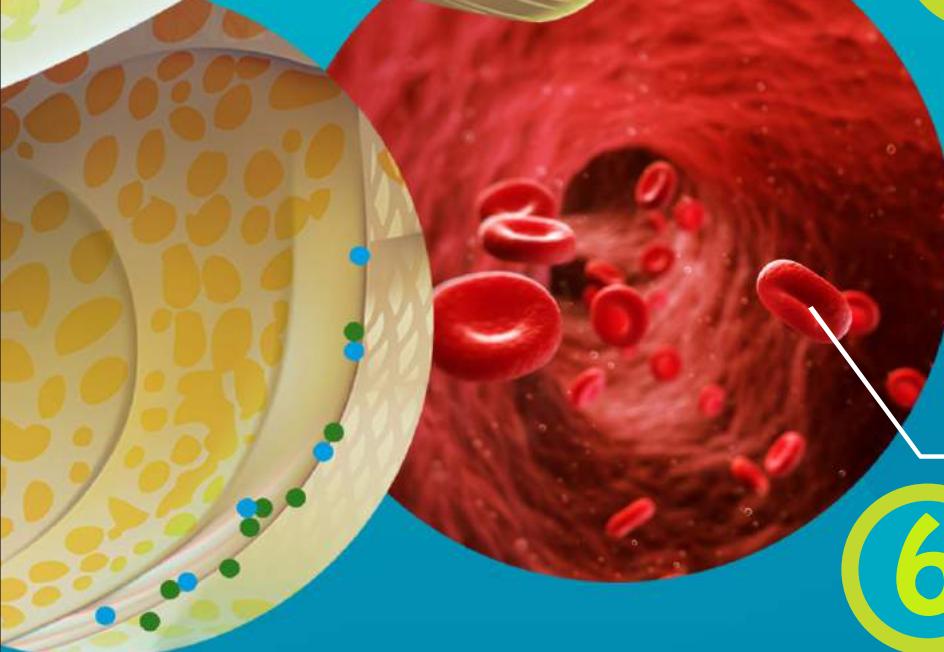
4

Alteration in the histology of the gills and squames compromises fish tissues as a result of pH⁹



5

Toxins released by cyanobacteria destroy the liver¹⁰



6

Deregulation of the hematocrit reduces the rate of red blood cells and makes breathing more difficult¹¹

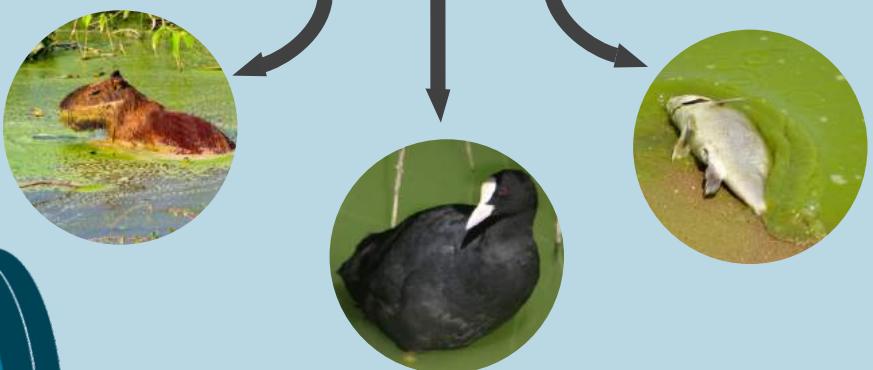
16 PROBLEM ANALYSIS

DODDS 2009¹⁵
ENDANGERED
SPECIES:
fishes
mussels
amphibious
dragonfly

There are 169
coast dead zones¹⁶
And 415 in
EUTROPHICATION process
in the WORLD

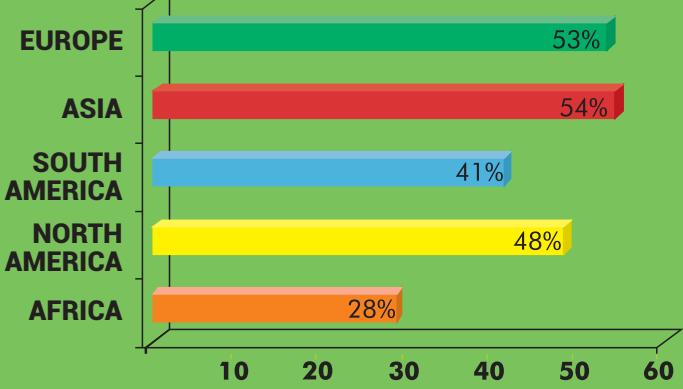
(SCORZA)

Animals suffer
with eutrophication:¹⁶
**Asphyxias, Intoxications,
Procreation Failures and
Environmental Imbalance**



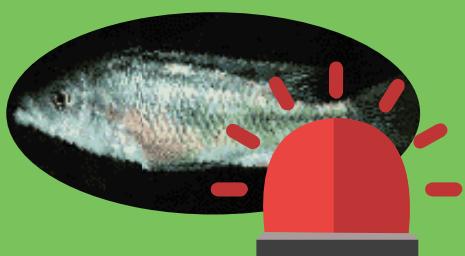
Reservoirs, lakes, rivers and oceans are

Percentage of eutrophicated lakes:¹⁸
(New World Encyclopedia)



VITORIA LAKE - AFRICA¹⁹

Fishes of specie HAPLOCHROMIS
were extincted, prejudicing
fishing and ecosystems!



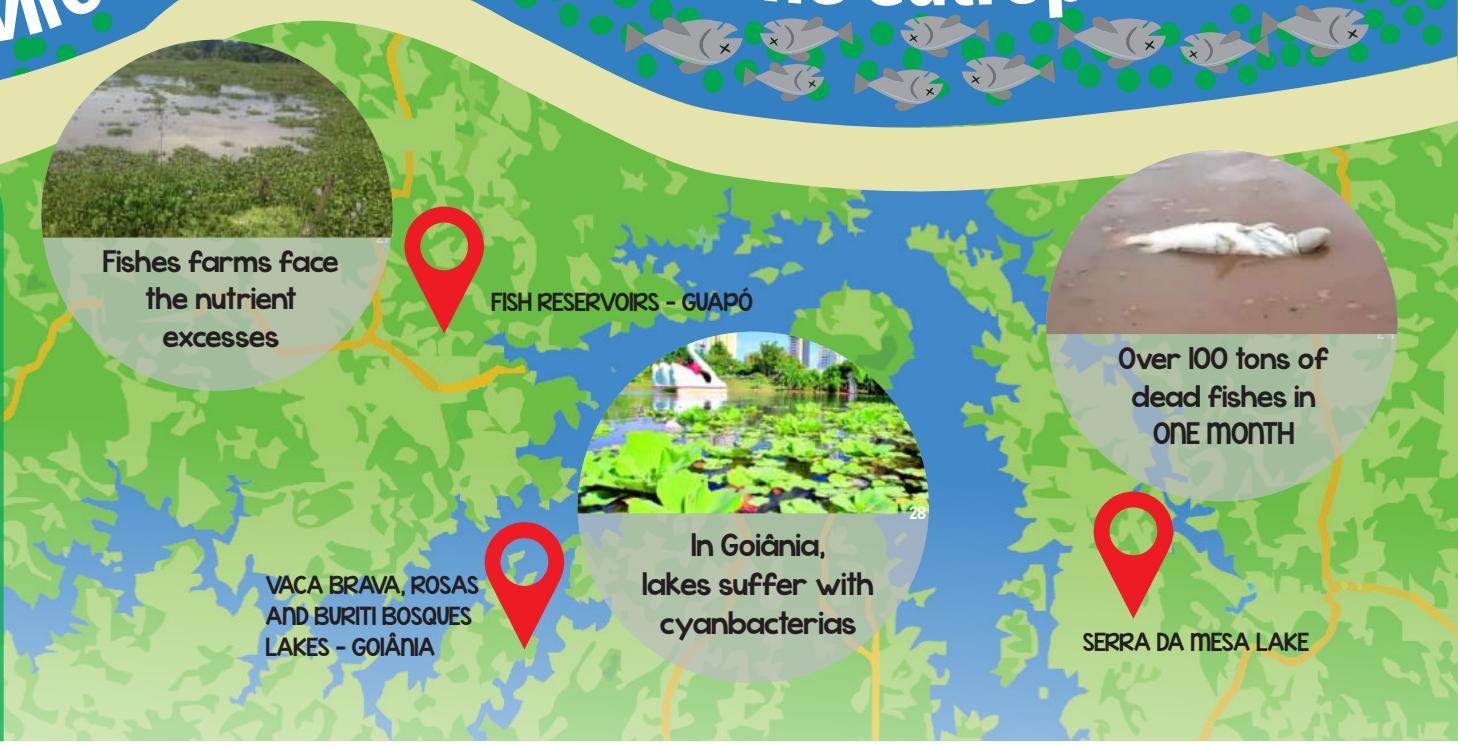
EUTROPHICATION'S VESTIGES IN THE WORLD

17



environments affected by the eutrophication.

EUTROPHICATION IN GOIÁS



OUR WAY TO THE FISH

TRAINING HAD BEGUN!

BEES



Studies about extinctions

DOGS



COCKROACHES



FOREST FIRE



AQUATIC ANIMALS



AUGUST

Energy produced by balls



Exoskeleton utilization



Pheromones Dispersant



Shark attacks Reduction



SEPTEMBER

Ultrasonic Dispersant



Burn Sensor



Death due the Turbidity of Water



OCTOBER

Fish deaths by eutrophication



NOVEMBER

WE USE THE

DIALETIC METHOD

TO DISCUSS
OUR PROJECTS!

EXISTING SOLUTIONS

We realized that DEATH OF FISHES caused by eutrophication can be solved in many ways!

PREVENTION!

- Prohibit the use of phosphate detergents
- Modernize treatment processes
- Control mines, farms, sewers and riverbank erosions sediments³⁰



Correcting venues that discard organic residues

LAWs!



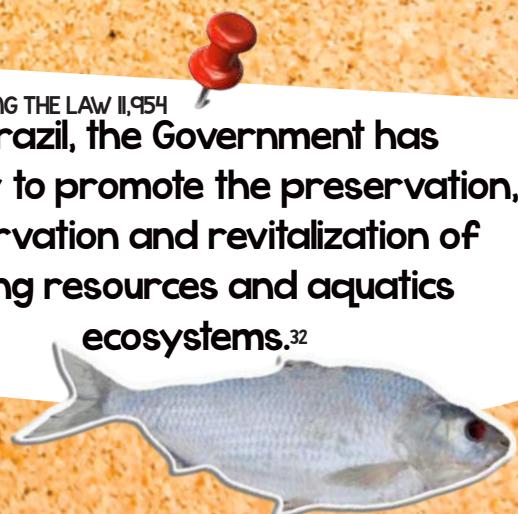
UNITED NATIONS CONVENTION
PART XII
PROTECTION AND PRESERVATION
OF THE MARINE ENVIRONMENT

Article 194

Measures to prevent, reduce and control pollution
of the marine environment

5. The measures taken in accordance with this Part shall
include those necessary to protect and pre-
serve rare or fragile ecosystems as well as the habitat
of depleted, threatened or endangered
species and other forms of marine life.³¹

ACCORDING THE LAW 11,954
In Brazil, the Government has
the duty to promote the preservation,
conservation and revitalization of
fishing resources and aquatics
ecosystems.³²



CLEANSING PROCESSES!

Herbicide treatments

Artificial aeration

Withdrawal of aquatic plants

Sediments dredging³³



Peruvian scientist Marino Morikawa created a cleansing system using nanobubbles to decontaminate the lake El Cascajo

Bubbles attract bacteria and metals through electric current causing a decomposition which releases free radicals that destroy virus present in water, avoiding death of fishes.³⁴



ERIE LAKE BLOOM

Practices for the rescue of Lake Erie (USA / CAN)



The idea of reversing the flowering problem of Lake Erie, located in North America, consisted of practices such as buying products without phosphorus; Used less fertilizer; Adopted a storm drain and supported local organic farmers³⁵

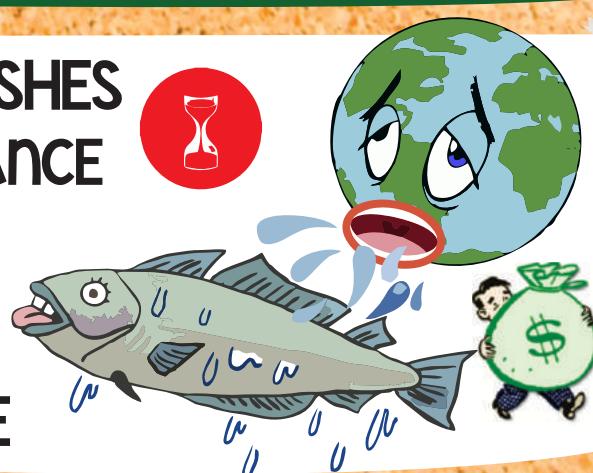


Many solutions were found, however...

- THEY HARM THE FISHES
- THEY CAUSE IMBALANCE

ENVIRONMENT

- THEY HAVE A HIGH COST
- THEY REQUIRE TIME





DECLARATION

I, **Felipe Marra de Moura**, with ID Card: 100.119.706-26/ MG121.38.506 SSPMG, Library Science of the institution Universidade Estadual de Goiás, in Brazil, certify that **GAMETECH Canaã**, Robotic' Team of Institution SESI/SENAI Vila Canaã, performed, with my supervision, the activities related about:

- Trademark search;
- Legislation search, jurisprudence, resolutions and international treaties based on especific data;
- Information source about scientific search.

The team has participated of all levels of searches, since the preparation until the data validation.

Available for better explanations, **Felipe Marra de Moura**.

Goiânia

May , 25th, 2017.



Felipe Marra
Bibliotecário
CRB: 3189/1

SOLUTION



with the Bolmoringa:

Life of FISH → Normalized in 8 MONTHS

100% eutrophicated lake



Moringa Oleifera

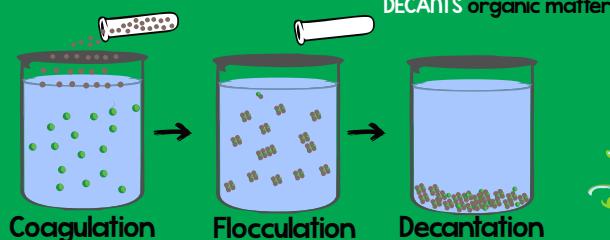
Shredded and placed in bags denominated BOLMORINGA

Why moringa oleifera?³⁶

- Particle of nitrogen and phosphorus
- Moringa oleifera extract

The MORINGA OLEIFERA has flocculant propriets

DECANTS organic matter

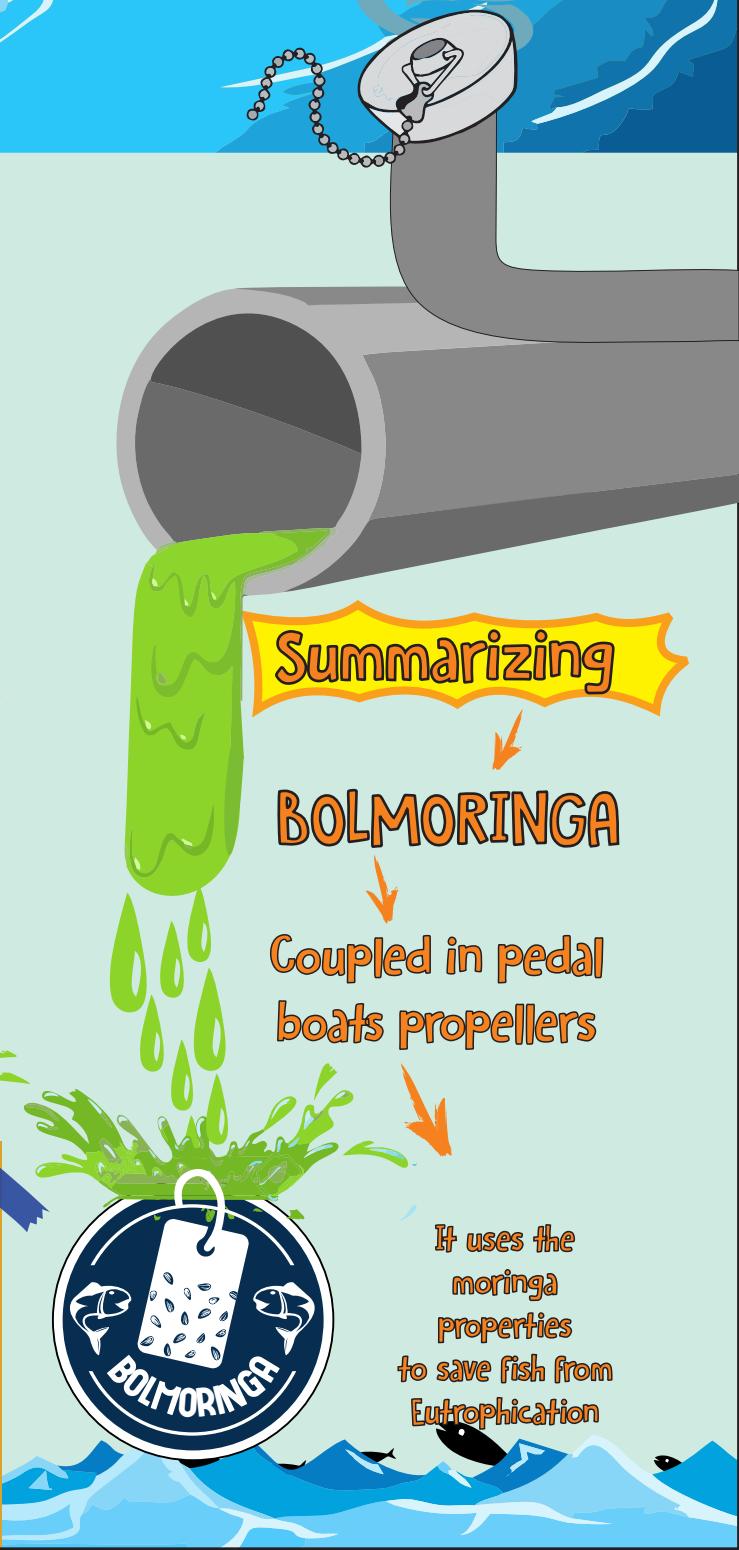


How will the water be mixed?

Pedal boats



Pedal boats propellers will mix the seed extract

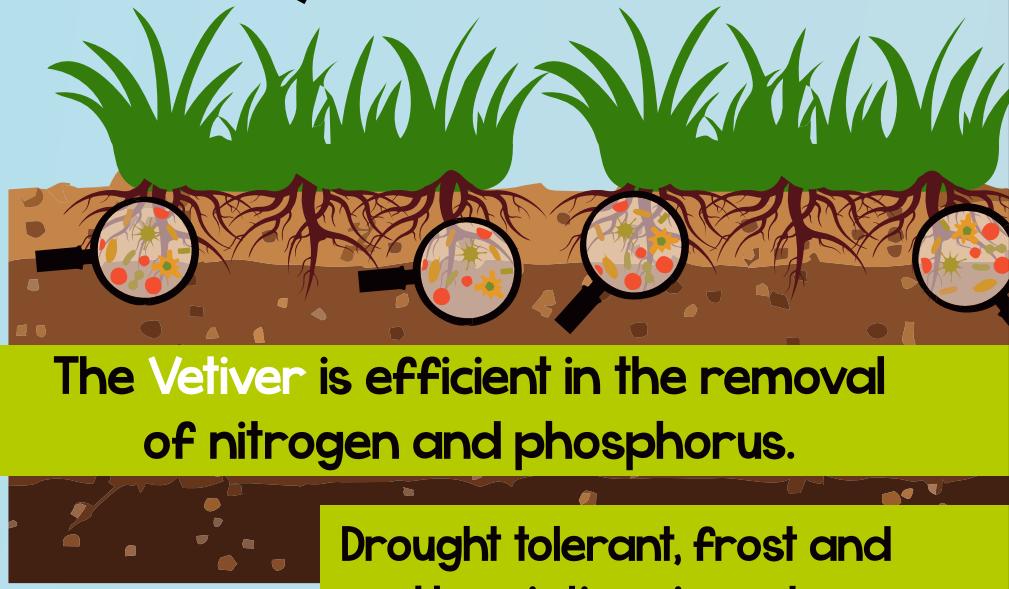


Complementary measures²³

VETIVER GRASS³⁷



Planted in the margins



The Vetiver is efficient in the removal of nitrogen and phosphorus.

Drought tolerant, frost and pH variations in water

Important

The vetiver will absorb the nitrogen and phosphorus that remained in the ambient

DREDGING SERVICE

In Brazil, it is mandatory to perform the service every 30 years³⁸

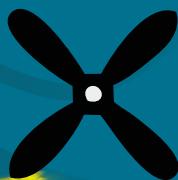


Dredging

The PEDAL BOATS

Available at the city halls

Four bolmoringas per propeller



It uses human action to save fish

Thereby...

Fish Habitat

Reestablished

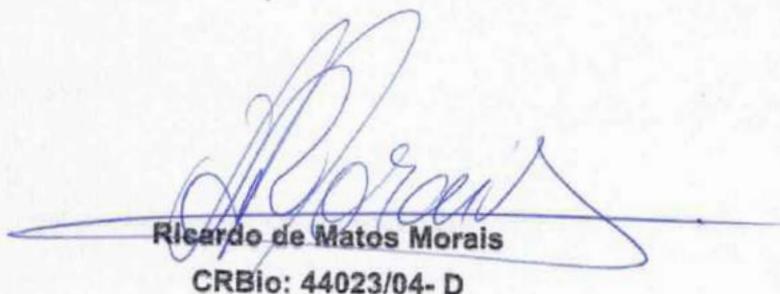


TECHNICAL REPORT

I, **Ricardo de Matos Moraes**, Pisciculturist and Biologist, confirm that I assisted the mentoring of the project **BOLMORINGA** and gave assistance with meetings, with the robotic team **GAMETECH CANAÃ** of SESI/SENAI Vila CanaÃ school, providing a technical report in knowledge about eutrofication effects in rivers and lakes and its impact in life of aquatic animals and flora.

I attest that **BOLMORINGA** project has all the potential to contribute positively to life quality of aquatic animals, because the project uses an organic extract for water treatment, with the objective to bring back the life to this environment, showing its efficiency and that is cheaper than other existent projects.

Available for better explanations, **Ricardo de Matos Moraes**.



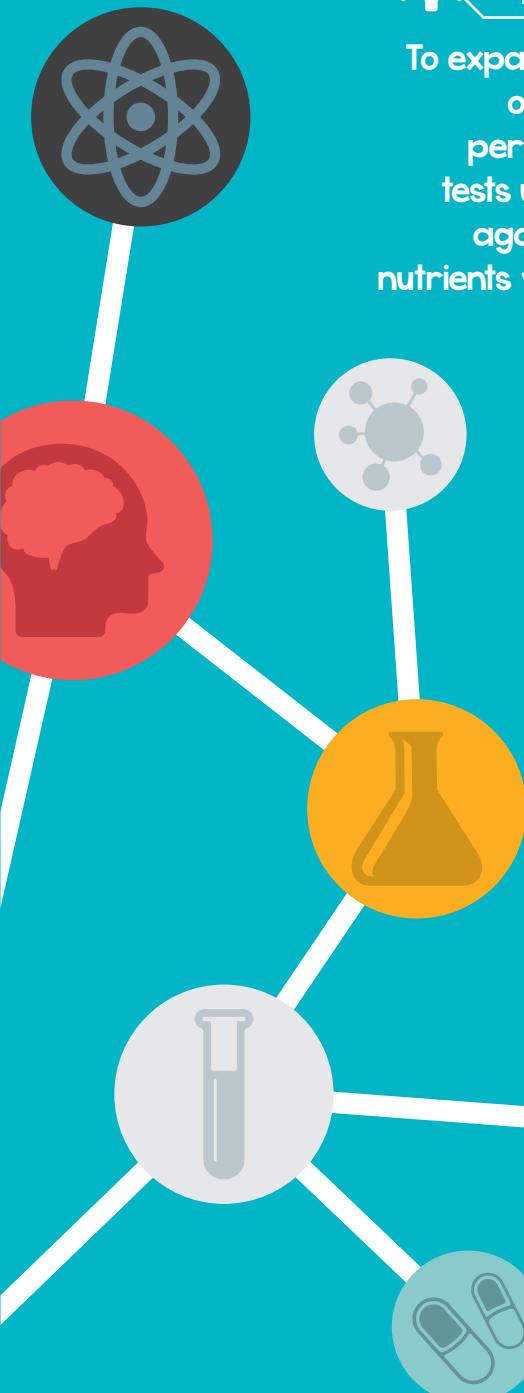
A handwritten signature in blue ink, appearing to read "Ricardo de Matos Moraes". Below the signature is a solid blue horizontal line. Underneath the line, the name "Ricardo de Matos Moraes" is printed in a small, black, sans-serif font. Below that, the text "CRBio: 44023/04- D" is also printed in a similar font.

LABORATORY TESTS



RESEARCH

To expand the credibility of our project, we performed scientific tests using Bolmoringa against the greatest nutrients which causes the death of fish by Eutrophication.



INFRASTRUCTURES



Physical-chemical laboratory - SENAI



Chemical laboratory - Conágua

PRINCIPAL MATERIALS



spectrophotometer



vacuum sealer

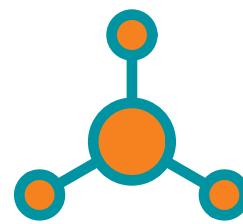


industrial crusher

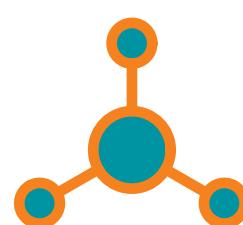


digital scale

ANALYSED SUBSTANCES



PHOSPHATE
 (PO_4^{2-})



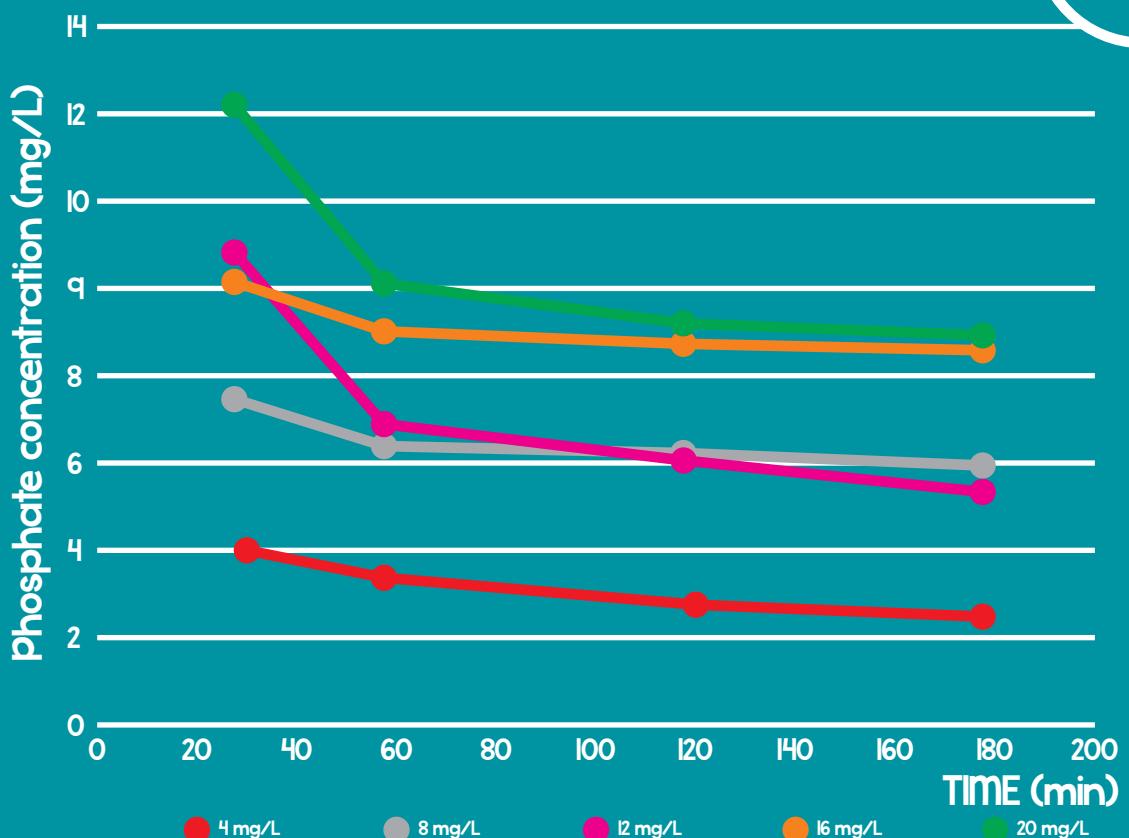
NITRATE
 (NO_3^-)

the principal causes of EUTROPHICATION

Chart description:

Analysis of Bolmoringa's effectiveness according the Phosphate removal.

PHOSPATE



Distributing the substances



Different concentrations of phosphate



Decanted water after 180 minutes

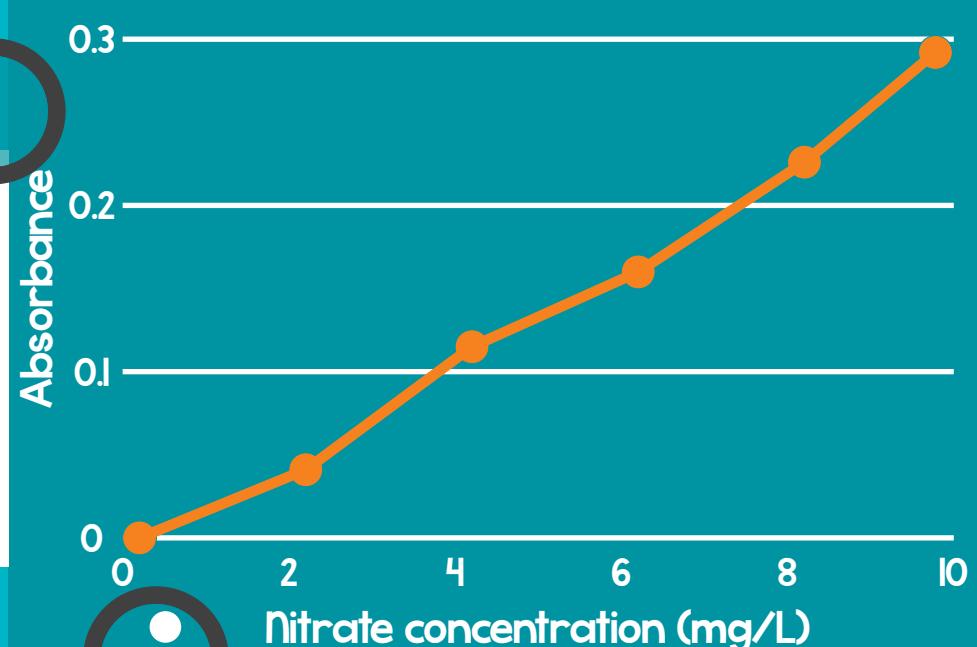


TEST CONCLUSION:

Our project is able to reduce until 65% of phosphate in water.

Chart description:

Analysis of Nitrate removal according the absorbance intensity.



What is Absorbance?

It is a measure of the capacity of a substance to absorb light of a specified wavelength.

↑ ABSORBANCE

↑ NITRATE REMOVAL

- This test was studied analysing water absorbance after periodic conferences
- Different concentrations showed us the nitrate removal of the water.



Decanted water after 120 minutes



Bolmoringa decanting the nitrate



Different concentrations of nitrate

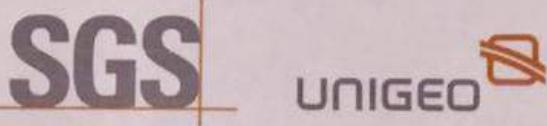


Distributing the substances

TEST CONCLUSION:

Bolmoringa reduces 14% of Absorbance, proofing the nitrate reducing.





We from the SGS Unigeo - Precision Agriculture declare for the proper purpose that we received the Gametech Canaã Robotic team from SESI SENAI school from Canaã village and the students representing this team presented their research project named "Bolmoringa", a potentially effective solution against the eutrophication, preventing the fishes death.

We seize this opportunity to give feedbacks and suggestions about how the students could improve their project because to us, this could be used in fish tanks in fish farming and fish-pay. Therefore, further the use of Bolmoring in lakes and rivers, that was the first purpose of the students, we believe that this idea could be an efficient to reduce the expenses in the cleanliness of the tanks in fish farming, supporting the development of the aquatic environment. Furthermore, we provide our point of view regarding the sustainability of the project and about its implementation in agricultural cooperatives in a more economical and beneficial way to the cooperative. We believe that in this meeting was possible to provide informations that can aggregate in the project contextualization of the students.

Below are the signatures of the SGS Unigeo's workers that participated of the meeting:

Amanda do Carmo Cândido

Amanda do Carmo Cândido
Agronomist engineer of the Engineer Department

Mayklyns Marcos de Almeida Linhares

Mayklyns Marcos de Almeida Linhares
Geography master of the Geoprocessing Department

Breno Augusto da Silva Amaral

Breno Augusto da Silva Amaral
Geoprocessing Department coordinator

Goiânia, February 24, 2017

SGS group, world leader in inspection, verification, testing and certification, announces the acquisition of 75% of UNIGEO, now renamed UNIGEO

SGS Unigeo | Agriculture, Food and Life - Rua 144, n. 166 - Setor Marista - CEP 74.170-030 - Goiânia - GO - t 62 3515.1115 - www.unigeo.com.br - www.sgsgroup.com.br

Membro do Grupo SGS ISDS SA



I, **Caroline Brandao Nascimento**, bearer of CPF 014.673.661-37 and RG 4595785, technical manager of **Conágua** analytical services laboratory, declare for the due purposes that we received the **GAMETECH Robotics team** from SESI SENAI Vila Canaã School and that The students presented the research project called "**Bolmoringa**". The boys performed an analytical test under my supervision, aiming the determination of the compounds Nitrite, Nitrate, and Total Phosphorus in two samples of water being one in normal process of eutrophication and the other with a pretreatment with Bolmoringa.

From the data gathered and the confluence with the project, we noticed an effective improvement in the water quality in which Bolmoringa was used in comparison to the one in which this technology was not used.

We suggest a more thorough examination, with the approval of the competent bodies, to proceed with a study of the variation of the samples in eutrophication times and states for a more accurate assessment of the properties of the use of Bolmoringa in the water and consequently of the healthy environment for the quality of the Survival of aquatic animals.

We encourage the continuity of this research as well as its implementation, which consequently will significantly affect aquatic fauna, specifically in the research object of the group, which are the fish.

I make myself available for future tests and clarifications that may be necessary.

Caroline Brandão Nascimento
Gerente Técnica
CRQ: 12200400

Caroline Brandão Nascimento
Caroline Brandão Nascimento
Technical Manager
CRQ: 12200400

Goiânia, January 31th, 2017.

MORINGA OLEIFERA PROPERTIES

Curiosity

DID YOU KNOW THAT MORINGA OLEIFERA IS COMMONLY USED IN BRAZIL AND AFRICA AS A SOLUTION TO SEVERAL PROBLEMS?

They are used at Africa continent for feeding programs to fight malnutrition. In the northeast region of Brazil, the seeds are used as a natural purifier of contaminated water to drink facing the droughts.³⁹

It adapts to different types of soil and is resistant to dry weather.⁴²

It contains a cationic protein that destabilize all particles present in water, coagulating, flocculating and finally decanting them.⁴³

It act as a natural coagulant more efficient than aluminum sulphate.⁴⁵

Roots are considered diuretic.⁴⁷

Moringa Oleifera's leaves are used to feed tilapias in the Nile replacing 10% of proteic diet significantly and altering their growth.⁴⁹

Moringa Oleifera contains more than 92 nutrients in 46 antioxidants types, in addition to 36 anti-inflammatory substances and 18 amin oacyds necessaries did not produced by the human body.⁴⁰



Trees reach 4 meters high in one year and produce about 3 tons of seed per year.⁴¹

In seeds' cotyledons there are ben-oils (flocculant substances) and the antimicrobial substance Lramnosyloxybenzylisothiocyanate that remove up to 97% of microbial load in water purification.⁴⁴



Embrapa emphasizes moringa as a purpose for cattle in the drought.⁴⁶

According Agricultural Sciences Institute of Minas Gerais University, water treatment with Moringa Oleifera REMOVES UP TO 99% OF WATER TURBIDITY.⁴⁸



IT DOESN'T AFFECT water pH.⁵⁰



INNOVATIONS

1 It reduces the death of fish and other aquatic animals by asphyxias, fungi and bacterias

2

It revitalizes aquatic fauna habitats

3

It preserves threatened endemic species of fish

4

It combines moringa seed with vetiver grass to increase the cleansing effectiveness

5

Fishes preservation method through the pioneer water treatment

6

Organic matter does not harm fishes

7

It reduces one of the greatest eutrophic aquatic problems, which it has not solved until now

8

Antibacterial product, ensuring fish health



BESIDES EVERYTHING, OUR PROJECT SEEKS TO ENSURE JOBS OF POPULATIONS WHO DEPEND ON FISHING, JOINTLY IMPROVING THE FISHES LIFE'S QUALITY.

IMPLEMENTATION

\$\$ Expense Summary \$\$

Converted to dollar
at May 22th, 2017 at
3:00 pm



Overhead costs

ITEMS	VALUE
Employee gross salary	US\$ 362.51
Energy	US\$ 9.47
BR tax (FGTS)	US\$ 29.01
TOTAL	US\$ 401.00

Inputs

Fabric Buttons	US\$ 108.60
	US\$ 52.04
Cultivation of moringa oleifera trees (x1000)	US\$ 554.35
TOTAL	US\$ 714.99

Materials

Grain grinder	US\$ 230.61
Vacuum sealer	US\$ 72.82
Production utensils	US\$ 24.04
Button rivet machine	US\$ 31.67
TOTAL	US\$ 359.15

Initial Investments

US\$ 1,475.18

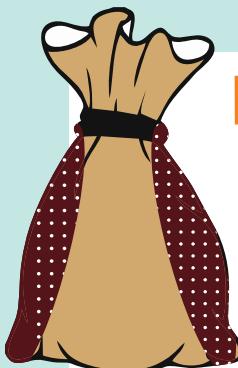
FINANCIAL
RETURNS

→ **2 months**



Estimated production
at full steam:

2,400 BOLMORINGAS /months
or **3 TONS /year**



Production cost:

US\$ 0.58

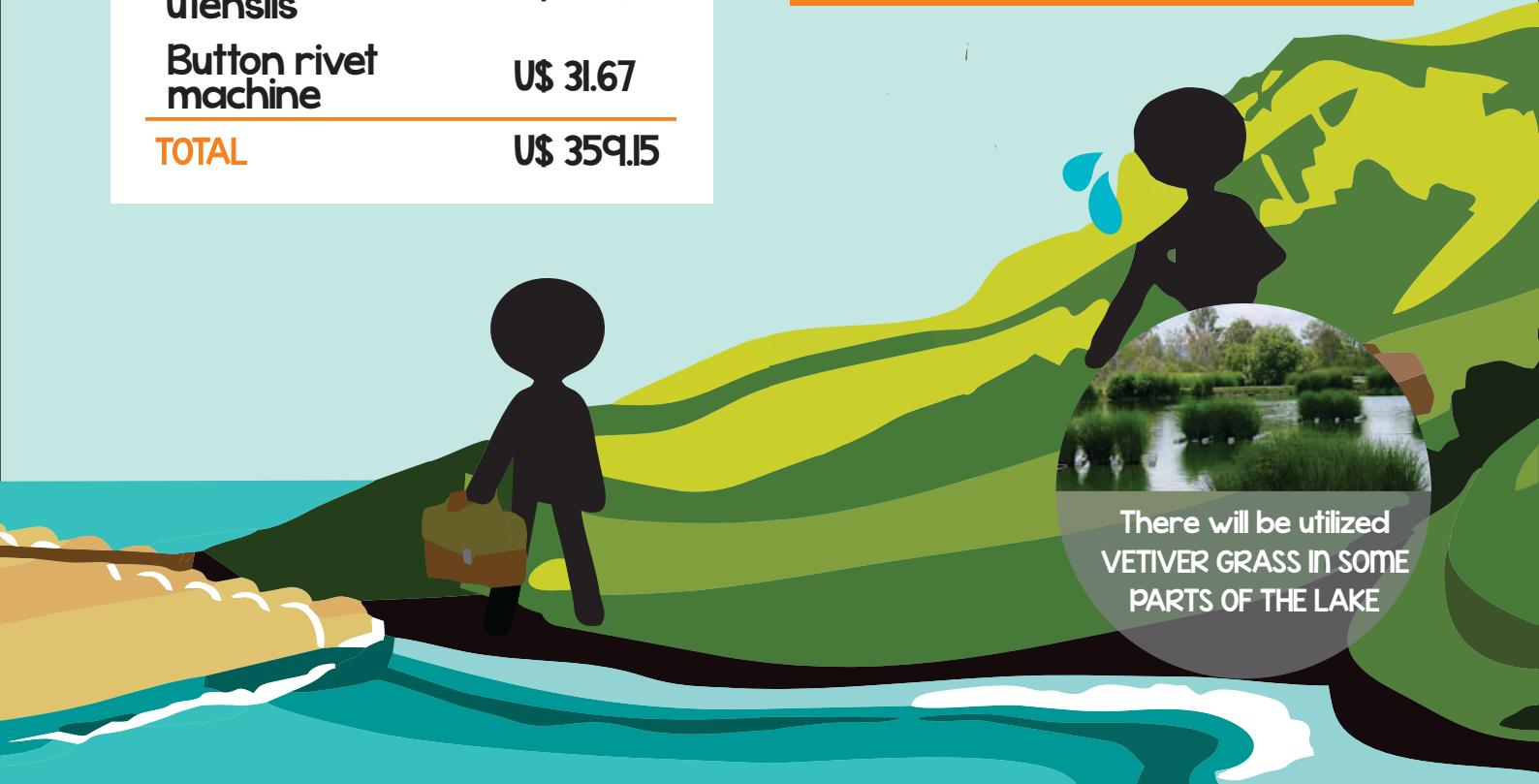
Sold at:

US\$ 1.26

1 BOLMORINGA - 1 m³ OF CLEANED WATER



There will be utilized
VETIVER GRASS in some
parts of the lake



IMPLEMENTATION

33



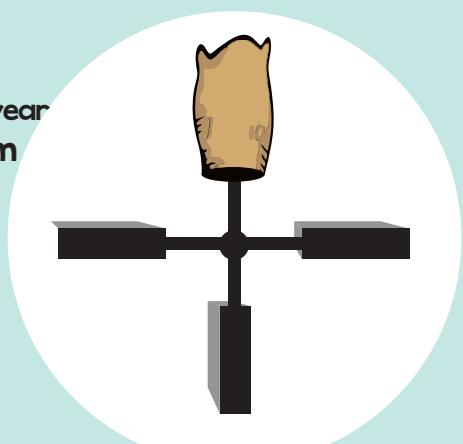
It Spends U\$4.5 BILLION/year

With **BOLOMRINGA**, exorbitant governmental expenses with **EUTROPHICATION** will be reduced.



It Spends U\$12 MILLION

With only one lake.⁵²



In BRAZIL, there is not any systematic programmation to evaluate EUTROPHICATION prejudices caused to the fishes.

The project is in approval process in the cities of **Pontalina** and **Guapó**



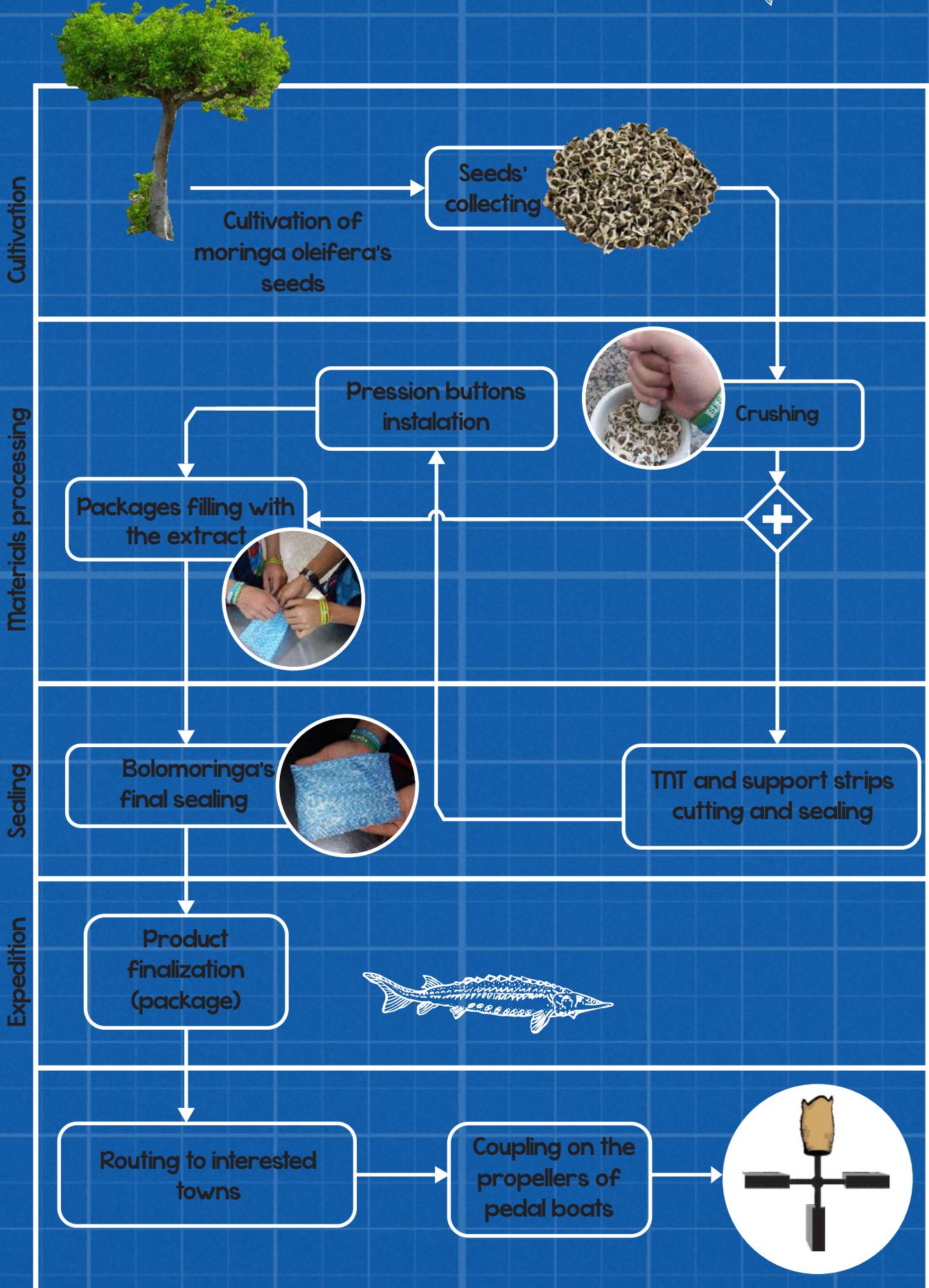
City Hall

It will buy a pack considering water analysis, technical reports and **BOLOMRINGAS**

It will encourage the population to enjoy public parks

% of N and P withdrawn	The Bolmoringa Implantation Time	Situation of Fish
5%	1 month	FISH DIED
10%	2 months	FISH IN DANGER
20%	4 months	FISH CAN LIVE
30%	6 months	FISH LIVE WELL
40%	8 months	FISH LIVE SAFELY

IMPLEMENTATION



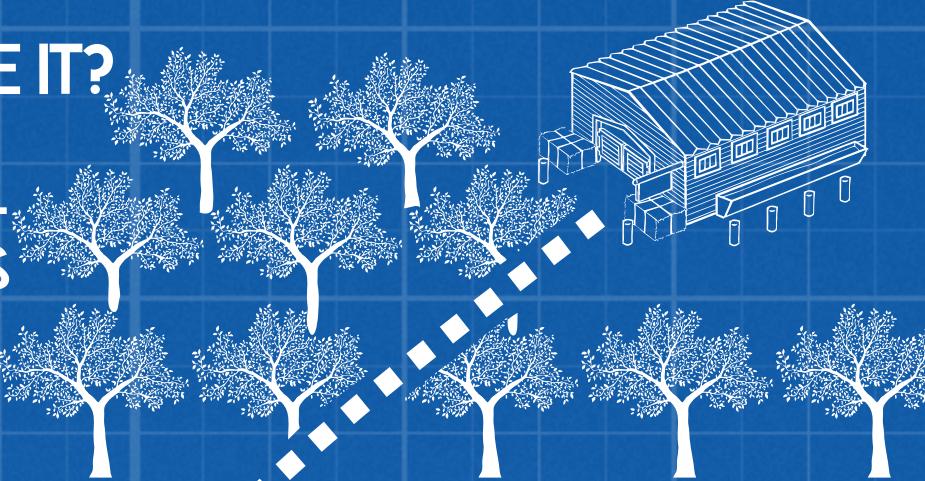
IMPLEMENTATION

35

WHO WILL PRODUCE IT?

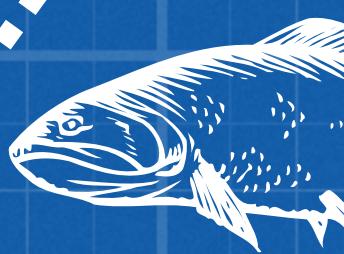
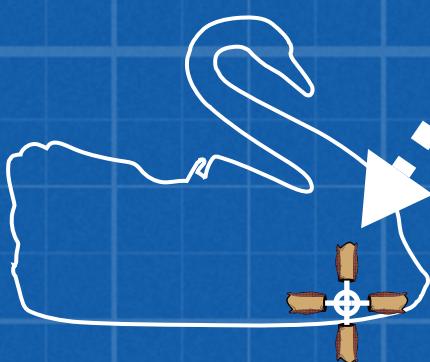


AGRICULTURAL
COOPERATIVES



! BASED IN THE
AGRICLUSTER
method

AND HOW WILL IT
BE IMPLANTED?



4 BOLMORINGAS
PEDAL BOAT

- 20 PEDAL BOATS /with 4 bolmoringas
- CHANGED EVERYDAY



FISHES saved in
8 months

IMPLANTED
IN ROSAS
LAKE



U\$ 11,853.77

of public expending

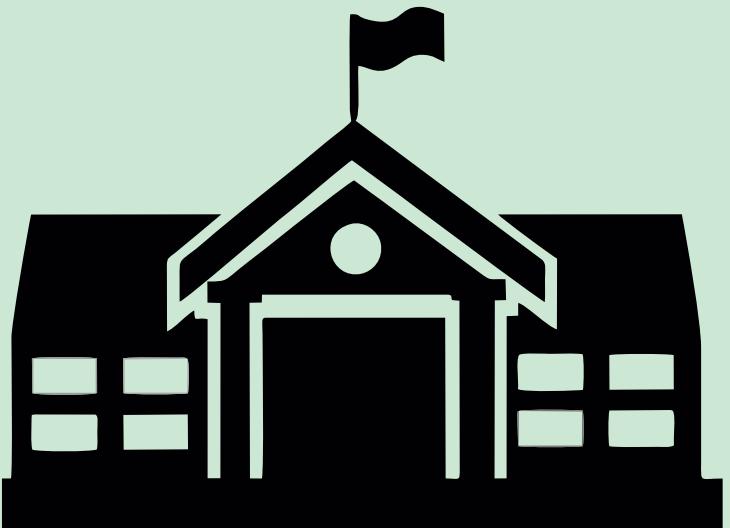
CONSIDERING 1000 VETIVER GRASSES SEEDLINGS

IMPLEMENTATION

City halls will detect environments with a high level of eutrophication.



City halls will get in touch with cooperatives, these ones will deal directly with them.



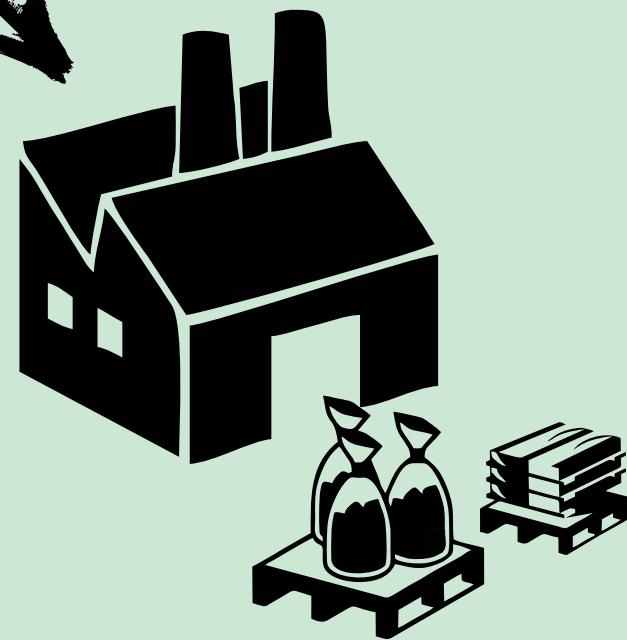
Specialized technician will go to lake/river for analyses of the habitat and provide budgets.



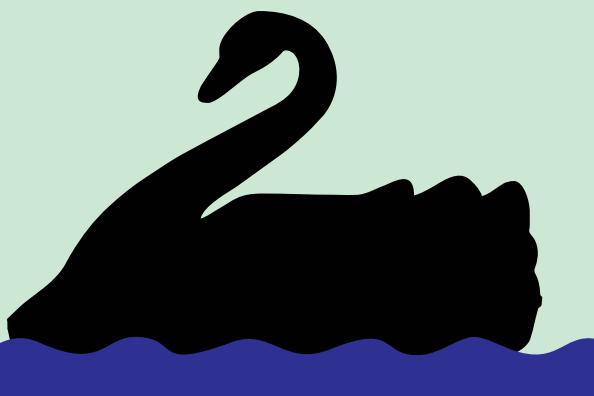


The estimative cost is sent to the City hall based in the technical analysis.

After the estimative cost is approved, a cooperative will deliver the material.



The cleaning service will be executed by employees of the city hall that will receive treinament of cooperatives.



Monthly, one technician will analyse the lake/river and will send to the laboratory that will issue the report.





I, Kézia Renata Rodrigues da Silva, id card 8.620.844-0, technical business consultant at the international innovation center belonged to the FIEP system. Through a consulting of creation and validation of new business carried out by the robotics team Gametech Canaã. I learned about the ways to develop and implement the bolmoringa project, where some improvements were proposed and we positively validated several aspects presented in said project.

I emphasize that bolmoringa is a project with innovative characteristics. As informed to the students I encourage a deep investigation through meticulous tests that will guarantee a higher efficiency of the results that need to be reached and the partnership extension to improve the business scalable potential.

Kézia Renata Rodrigues da Silva

Curitiba, February, 09th 2017



Preview Costs

Initial Investments		Monthly expenses	
Vacuum sealing	US\$ 72,82	Energy (machines)	US\$ 9,47
Grain grinder	US\$ 230,61	Fabric	US\$ 160,54
Button rivet machine	US\$ 31,67	Employee Costs	US\$ 362,51
Utensils for production	US\$ 24,04	Cultivation of moringa trees	US\$ 544,35
	US\$ 359,15		US\$ 1076,87

According to the collective agreement of rural cooperative work in the state of Goiás:

01 EMPLOYEE	PROVISIONS	DISCOUNTS	FINAL COST OF EMPLOYEE
Salary	US\$ 278,17		
Subsistence allowance	US\$ 33,01		
Alimentation	US\$ 30,65		
INSS		-US\$ 28,07	
FGTS	US\$ 28,07		
TOTAL:	US\$ 369,84	US\$ 28,07	US\$ 341,77

Since the value of the employee's discounted INSS is passed on to the government through the GPS (Social Security Guide). The value of US\$ 28,07 (Twenty Eight dollars and Seven cents), regarding FGTS (guarantee fund for time of service) . The cooperative through the GRF (FGTS collection guide). Employee cost per month will be US\$ 341,77 (three hundred and forty one and seventy seven cents).

With the average initial production of 2400 bolmoringas per month the final cost of each product will be US\$ 0,58 (fifty eight cents).

Goiânia-Goiás, February, 20th 2017

Mara Nubia Moreira Trindade
Rua 05, nº 263 - Vila Izaura
Goiânia-GO - CRC-GO 20453/0-0
Tel.: (62) 3211-4931 / 8425-6094

3M CONTABILIDADE - Rua 5 nº 263 - Vila Izaura
Fone: 3211-4931 / 8505-3574
CEP.: 74553-090 - Goiânia - Goiás
tresmcontabilidade@hotmail.com

Legislation Power
Pontalina's Town Hall



DECLARATION



I declare for the law purpose that the robotics team Gametech Canaã of the SESI/SENAI school were with the municipal mayor of Pontalina, Mr. Milton Ricardo de Paiva, where the team of the Bolmoringa project made a deep explanation of their project.

It's all for the current moment, thank you in advance.

Yours truly,

MILTON RICARDO DE PAIVA
Prefeito Municipal

Pontalina-GO, February, 23th 2017

DECLARATION

I declare for the law purpose that the robotics team Gametech Canaã of the SESI/SENAI school were with the president of Pontalina Town Council, Mrs. JOANA D'ARC DE GODOI, where the team of the Bolmoringa project made a deep explanation of their project.

Pontalina-GO, February, 23th 2017

= JOANA D'ARC DE GODOI =
Vereadora Presidente.

PRACA JUSTO MAGALHÃES – FONE: (64) 3471-1623/ 3471-1158
CEP:78620-00 - PONTALINA GOIAS

Technical Advice

I, Antônio Pereira Gonçalves, owner of the following ID card: 5945119, living in Mariana/MG, member and leader of the commission of the people affected by the tragedy of the dams breach in Minas Gerais. I affirm that there was an exchange of information and experience between the team and our community, with the main reason to develop an idea to the research project related with the subject: The death of fish caused by the turbidity of water. We have seen a great potential in the started idea, once that a solution to the turbidity of water would be totally useful to us, affected by the tragedy of Mariana/MG. Besides, it would revitalize the environment that used to inhabit fish and other animals that used to live here first and died due the problem above, threatening almost 80 fish species.

Me, Lindomar Alves de Paula, owner of the following ID card: 2.310.537 and Tax ID 848.057.221-34, established councilor of the city of Guapó located in the State of Goiás, I speak on behalf of the city to declare to the purpose that we receive the robotics team Gametech Canaã of the School SENAI Vila Canaã, and that the students of this team presented the project research called "Bolmoringa", as a solution to save the fish's lives that inhabit the lakes of our city.

During a demonstration, we noticed that the project has a big potential to aggregate considerable value to our community, once that in the lake of our city there are fishermen who live from this activity. Because of this situation, we had a huge interest in the implementation of this product, once that we already suffered with that problem. We brought the presentation to the city council. The politicians appreciated the project and the implementation proposal in our city as well.

Besides, the students presented the performed tests with Bolmoringa, that demonstrate the efficacy of the project in small and large scale. We encourage the continuity of the project will affect positively in the aquatic fauna, specially with the fish and will improve the community life that depends of the fishing in our neighborhood.

I make myself available to future doubts if necessary.



Antônio Pereira Gonçalves

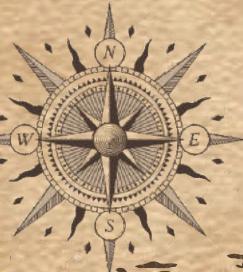


Lindomar Alves de Paula

Guapó, February, 24th 2017

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SHARING



PUBLIC AUDIENCE



UNIVERSITIES



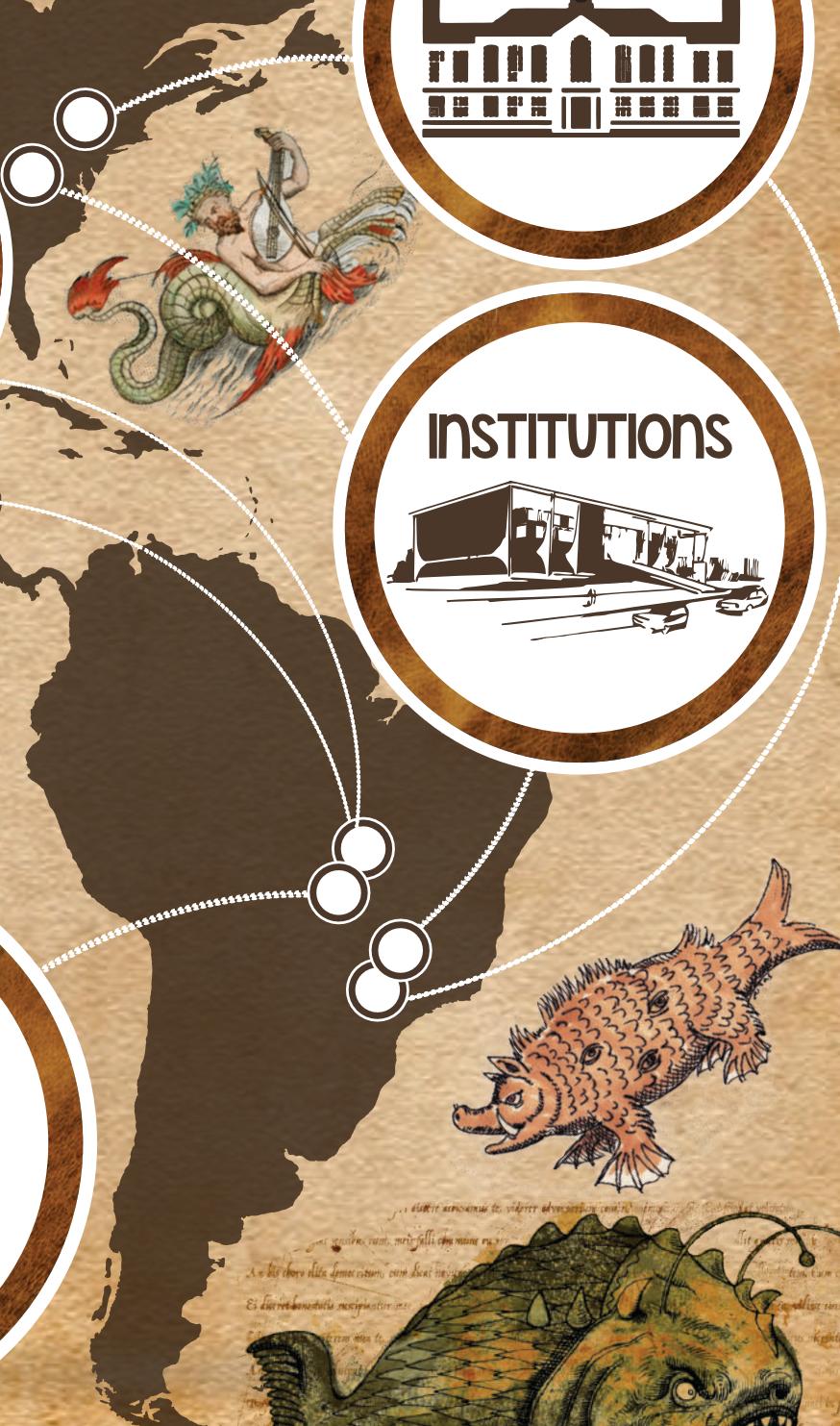
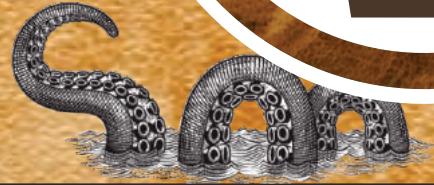
SPECIALISTS



INSTITUTIONS



POLITICAL
REPRESENTATIVES



SHARING

PUBLIC AUDIENCE



AGROFORESTRY SPECIALIST
PABLO



PONTALINA'S
MAYOR



VERDIVALE
nGOs



COMISSION OF THE
MARIANA'S DAM BREAKING
AFFECTED PEOPLE

SHARING

UNIVERSITIES



ST. BONAVENTURE
UNIVERSITY

BLUEFIELD
COLLEGE



AMERICAN
UNIVERSITIES



DOCTOR IN AGRONOMY
EMILIANO GODOI

UEG
STATE UNIVERSITY
OF GOIÁS



USP
University
of São Paulo

Gametech Canaã <gametechca>
para comgradvet, miliane, coordvet,

cocmedvet@usp.br
para mim

Boa tarde!
Nos colocamos à disposição!
att.

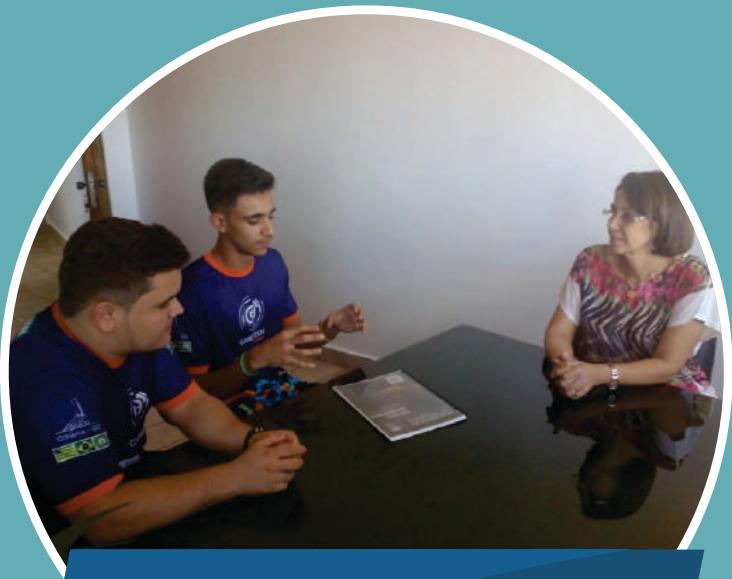


SHARING

POLITICAL REPRESENTATIVES



PONTALINA'S (GO)
MAYOR



CHAMBER PRESIDENT
OF PONTALINA

SHARING SPECIALISTS



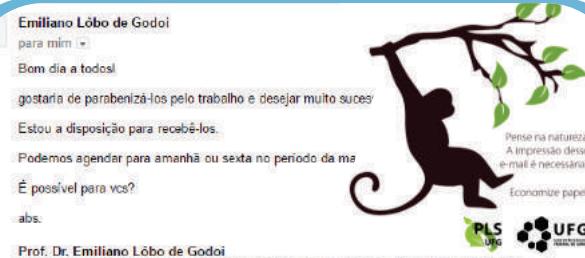
CONÁGUA



**SANEAGO TECHNICIAN
WILMA GOMES**



SGS UNIGEO



**DOCTOR IN AGRONOMY
EMILIANO GODOI**



CLÁUDIA PAULA ZOOTECHNIST



**FISH FARMING MASTER
RICARDO DE MATOS**



Doctor InA NOGUEIRA - UFG



SHARING INSTITUTIONS



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GOOGLE REPRESENTATIVES IN
CIENTISTABETA EVENT



EMBRAPA - EMPRESA BRASILEIRA
DE PESQUISA AGROPECUÁRIA
(BRAZILIAN AGRICULTURAL
RESEARCH CORPORATION)



NATIONAL HISTORY MUSEUM
OCEANOGRAPHIC SPECIALIST
(WASHINGTON D.C.)



Santo Antônio de Goiás, February, 20th 2017



Technical Advice

I am Pricila Vetrano Rizzo, owner of the following ID CARD: 33.820.787-9, and I work as technology transfer analyst of Embrapa Gado de Leite in the "Núcleo de Apoio à Transferência de Tecnologia no Centro Oeste" (Nucleus of Support to the Transfer of Technology). I got the knowledge about the Bolmoringa project and its advantages through a presentation performed by the robotics team Gametech Canaã from the school SESI Canaã.

I ensure that the project was presented to the staff of our company who works in the field of agriculture and cattle raising. They have a great knowledge about the Moringa Oleífera's seed and about the waste and water quality treatment. We believe that the Bolmoringa project is innovative and has the capacity to become an alternative to reduce the death of fishes and other aquatic animals due eutrophication.

Therefore, we provide the support to the team Gametech Canaã through the sharing of technical information about the Moringa Oleifera features. We are able to provide the contact of people and institutions that can establish partnerships with them as well.

Best regards

A handwritten signature in blue ink, appearing to read "Pricila Vetrano Rizzo".

Pricila Vetrano Rizzo

Technology Transfer Analyst
Nucleus of Support to the Transfer of Technology - Middle West
Embrapa Gado de Leite
(The Brazilian Agricultural Research Corporation)

REFERENCES



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- 1 - GL Pescador denuncia morte de peixes no Lago Serra da Mesa, em GO, 2016. Available in: <<http://gl.globo.com/goias/noticia/2016/01/pescador-denuncia-morte-de-peixes-no-lago-serra-da-mesa-em-go-video.html>>. Accessed in November 23th 2016.
- 2 - EBC, Empresa Brasil de Comunicação. Poluição em Lagoa causa a morte de milhares de peixes. Available in: <<http://www.ebc.com.br/noticias/2015/09/poluicao-em-lagoa-do-rio-causa-morte-de-milhares-de-peixes>>. Accessed in May 3rd 2017.
- 3 - YAMADA, GABRIELA. FOLHA DE SÃO PAULO. Centenas de peixes morrem no rio Pardo, interior de SP , 2011. Disponível em: <<http://fotografia.folha.uol.com.br/galerias/4434peixes-mortos-no-rio-pardo>>. Acesso em: 25 nov.2016.
- 4 - PUGLISE, Nicole. New York canal covered in dead fish. The Guardian, November 17th, 2016. Available in: <<https://www.theguardian.com/us-news/2016/nov/17/new-york-shinnecock-canal-dead-fish-die-off>> Accessed in May 1st, 2017.
- 5 - FEDERMAN, Adam. What killed Dunkard Creek? Available in: <http://www.earthisland.org/journal/index.php/eij/article/what_killed_dunkard_creek>. Accessed in May 3rd, 2017.
- 6 - MARTINEZ, C. AZEVEDO, F. WINKALER, E. Toxicidade e Efeitos da Amônia em Peixes Neotropicais. Available in: <<http://www.uel.br/laboratorios/lefa/Cap/C3/ADtulo/206-toxicidade/20e/20efeitos/20da/20amonia/20em/20peixes/20neotropicais,/202006.pdf>>. Accessed in April 22th 2017.
- 7 - MATOS, Ricardo de. Fish Farming Master. 2016 24th November.
- 8 - ALPHEN, J. SEEHAUSEN, O. WITTE, F. Cichlid Fish Diversity Threatened by Eutrophication That Curbs Sexual Selection. Science, 19 Sep 1997: Vol 277. Available in: <<http://science.sciencemag.org/content/277/5333/1808>>. Accessed in November 27th 2016.
- 9 - MARTINEZ, C. AZEVEDO, F. WINKALER, E. Toxicidade e Efeitos da Amônia em Peixes Neotropicais. Available in: <<http://www.uel.br/laboratorios/lefa/Cap/C3/ADtulo/206-toxicidade/20e/20efeitos/20da/20amonia/20em/20peixes/20neotropicais,/202006.pdf>>. Accessed in April 22th 2017.
- 10 - Master CERON, L. A dualidade das algas: eutrofização em águas e a depuração de efluentes. Available in: <https://www.researchgate.net/publication/281973364_A_dualidade_das_algas_eutrofizacao_em_aguas_e_a_depuracao_de_efluentes>. Accessed in April 22th 2017.
- 11 - MARTINEZ, C. AZEVEDO, F. WINKALER, E. Toxicidade e Efeitos da Amônia em Peixes Neotropicais. Available in: <<http://www.uel.br/laboratorios/lefa/Cap/C3/ADtulo/206-toxicidade/20e/20efeitos/20da/20amonia/20em/20peixes/20neotropicais,/202006.pdf>>. Accessed in April 22th 2017.
- 12 - MATOS, Ricardo de. Fish Farming Master. 2016 24th November.
- 13 - MATOS, Ricardo de. Fish Farming Master. 2016 24th November.
- 14 - University of Gothenburg. Available in: <http://www.gu.se/english/about_the_university/news-calendar/News_detail/?contentId=968553>. Accessed in February 24th 2017.
- 15 - DODDS, K. WALTER. Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages. Available in: <<http://www.kstate.edu/doddslab/journalarts/dodds/20et/20al/20est/202009.pdf>>. Accessed in November 27th 2017.
- 16 - CERON, L (Master). A dualidade das algas: eutrofização em águas e a depuração de efluentes. Pontifícia Universidade Católica do Rio Grande do Sul, August 2011. Available in: <https://www.researchgate.net/publication/281973364_A_dualidade_das_algas_eutrofizacao_em_aguas_e_a_depuracao_de_efluentes>. Accessed in Accessed in April 22th 2017.
- 17 - SCORZA, A. Principais problemas ambientais desde 1972. Revista Veja, 2012. Disponível em: <<http://veja.abril.com.br/ciencia/principais-problemas-ambientais-desde-1972/>>. Accessed in November 27th 2016.
- 18 - Encyclopédia New World. Eutrophication. Available in: <<http://www.newworldencyclopedia.org/entry/Eutrophication>>. Accessed in November 21th 2016.



- 19 - UNEP. How Bad Is Eutrophication at Present? United Nations Environment Programme. Available in: <http://www.unep.or.jp/ietc/publications/short_series/lakereservoirs-3/2.asp>. Accessed in November 22th 2016.
- 20 - NAP. What Are the Effects of Nutrient Over Enrichment. Available in: <<https://www.nap.edu/read/9812/chapter/6>>. Accessed in November 21th 2016.
- 21 - TRIBUNAL DE CONTAS EUROPEU. Combater a eutrofização no mar Báltico: são necessárias medidas adicionais e mais eficazes, 2016. Available in: <http://www.eca.europa.eu/Lists/ECADocuments/SR16_03/SR_Baltic_PT.pdf>. Accessed in November 23th 2016.
- 22 - Saskatchewan University. JIA, J. LUO, W. LU, Y. GIESY, J. Bioaccumulation of microcystins (MCs) in four fish species from Lake Taihu, China: Assessment of risks to humans. Available in: <<http://www.usask.ca/toxicology/jgiesy/pdf/publications/JA-797.pdf>>. Accessed in May 1st 2017.
- 23 - CCLAUSEN. Tablazo Bay & Maracaibo Lake. Available in: <http://www.cclausen.net/maracaibo_from_space.html>. Accessed in May 5th 2017.
- 24 - ZEYDAN, B. The Nile Delta in a Global Vision. Available in: <<http://lwtc.info/2005.pdf/01-3.pdf>>. Accessed in May 5th 2017.
- 25 - KOOP, K. DAVIS, J. Eutrophication in Australian rivers, reservoirs and estuaries - a southern hemisphere perspective on the science and its implications. Available in: <<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.516.5093&rep=repl&type=pdf>>. Accessed in May 5th 2017.
- 26 - Encyclopédia New World. Eutrophication. Available in: <<http://www.newworldencyclopedia.org/entry/Eutrophication>>. Accessed in November 21th 2016.
- 27 - MATOS, Ricardo de. Fish Farming Master. 2016 24th November.
- 28 - FARIA, M. NOGUEIRA, I. PIMENTEL, R. Caracterização da Comunidade de Algas Fitoplancônicas do Lago Vaca Brava Goiânia (GO). REVISTA ELETRÔNICA DE EDUCAÇÃO DA FACULDADE ARAGUAIA, 7: 311-324, 2015. Available in: <<http://www.fara.edu.br/sipe/index.php/refara/article/view/341/308>>. Accessed in November 23th 2016.
- 29 - GI. Pescador denuncia morte de peixes no Lago Serra da Mesa, em GO, 2016. Available in: <<http://g1.globo.com/goias/noticia/2016/01/pescador-denuncia-morte-de-peixes-no-lago-serra-da-mesa-em-go-video.html>>. Accessed in November 23th 2016.
- 30 - DOMINGUES, A. GRANJA, D. MAGALHÃES, D. SARAIVA, J. SILVA, F. Disponibilidade de água doce - haverá água doce suficiente para cada humano a nível mundial? Faculdade de Engenharia da Universidade do Porto. Projeto FEUP, grupo 210, 2009/10. Available in: <http://paginas.fe.up.pt/~projfeup/cd_2009_10/relatorios/R210.pdf>. Accessed in November 21th 2016.
- 31 - NATIONS, UNITED. Protection and Preservation of the Marine Environment. Available in: <http://www.un.org/Depts/los/convention_agreements/texts/unclos/partI2.htm>. Accessed in April 26th 2017.
- 32 - REPÚBLICA, DA PRESIDÊNCIA. Subchefia para Assuntos Jurídicos. Available in: <https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2009/lei/111959.htm>. Accessed in February 25th 2017.
- 33 - DOMINGUES, A. GRANJA, D. MAGALHÃES, D. SARAIVA, J. SILVA, F. Disponibilidade de água doce suficiente para cada humano a nível mundial? Faculdade de Engenharia da Universidade do Porto. Projeto FEUP, grupo 210, 2009/10. Available in: <https://paginas.fe.up.pt/~projfeup/cd_2009_10/relatorios/R210.pdf>. Accessed in November 21th 2016.
- 34 - PINHEIRO, R. Cientista peruano usa nanotecnologia para recuperar lago poluído. Available in: <http://www.agenciaplano.com/por/noticias.php?cod_noticia=60>. Accessed in November 3rd 2016.
- 35 - BUTAUSKY, K. Saving Lake Erie. Available in: <<http://www.beachwoodohio.com/DocumentCenter/View/1766>>. Accessed in April 25th 2017.
- 36 - A.F.S. Santos¹, M. Rodrigues¹, J. Cardoso¹, A.C. Rodrigues¹, J.A.C. Teixeira¹, P.M.G. Paiva², L.C.B.B. Coelho², A.G. Brito³, G. Martins¹ (1)UMinho, Centre of Biological Engineering, Braga, PT (2)UFPE, Dep. de Bioquímica, Recife, Brazil (3) ULisboa, ISA, Dep. of Biosystems Sciences and Engineering, Lisbon. Evaluation of *Moringa oleifera* Seed Flour and Clays as Clarifying Agents of Eutrophic Lake Water. Available in: <<http://hdl.handle.net/1822/31742>>. Accessed in November 18th 2016.
- 37 - ALMEIDA, E. Avaliação do potencial da espécie *vettiveria zizanioides* na fitorremediação de metais-traço



- presentes em ambientes aquáticos. In: Universidade Federal de Minas Gerais. Programa de Pós-Graduação em Saneamento, Meio Ambientes e Recursos Hídricos. Pag. 37.
- 38 - SANTOS, THIAGO. Environmental Engineering and Specialist in Sanitation. October 20th 2016.
- 39 - SUMMERLY, John. Its leaves contain all essential amino acids and its seeds purify water. Available in: <<http://www.wakingtimes.com/2015/10/28/its-leaves-contain-all-essential-amino-acids-and-its-seeds-purify-water/>>. Accessed in May 5th 2017.
- 40 - LIMA, Niedja. Aplicação da Moringa Oleifera no tratamento de água com turbidez. Available in: <http://www.unicap.br/tede//tde_arquivos/6/TDE-2015-06-26T14409Z-762/Publico/niedja_maria_lima.pdf>. Accessed in February 2nd 2017.
- 41 - CHIAPPETA, Marina. Moringa, a planta que purifica a água e poderia acabar com a fome mundial. Available in: <<http://www.ecycle.com.br/component/content/article/62-alimentos/3666-moringa-a-arvore-que-purifica-a-agua-e-poderia-acabar-com-a-fome-mundial-superalimentos-saude-nutricao-desnutricao-folhas-medicinal-tratamento-milagrosa-vitaminas-.html>>. Accessed in February 2nd 2017.
- 42 - Lam para tratamento de água produzida. Available in: <<http://www.redalyc.org/pdf/810/8102140005.pdf>>. Accessed in February 2nd 2017.
- 43 - GUALBERTO, André; FERRARI, Glaúcia; ABREU, Karla; PRETO, Bruno; FERRRI, Jéferson. Características, propriedades e potencialidades da moringa (*Moringa oleifera* Lam.): Aspectos agroecológicos. Available in: <<http://ocji.net/articles/2015/2238-1445966686.pdf>>. Accessed in February 2nd 2017.
- 44 - PASSOS, Rafaela; SANTS, Dhulia; SANTOS, Bianca; SOUZA, Daniella; SANTOS, João; SILVA, Gabriel. QUALIDADE PÓS-COLHEITA DA MORINGA (*MORINGA OLEIFERA LAM*) UTILIZADA NA FORMA IN NATURA E SECA. Available in: <<http://www.revistageintec.net/portal/index.php/revista/article/viewFile/92/171>>. Accessed in February 2nd 2017.
- 45 - TEIXEIRA, Estelamar. CARACTERIZAÇÃO QUÍMICA E NUTRICIONAL DA FOLHA DE MORINGA (*Moringa oleifera* Lam.). Available in: <http://repositorio.unesp.br/bitstream/handle/11449/100064/teixeira_emb_dr_arafcf.pdf?sequence=1>. Accessed in February 20th 2017.
- 46 - BARRETO, Milena; FREITAS, João; SILVEIRA, Edilberto; BEZERRA, Antônio; NUNES, Edison; GRAMOSA, Nilce. Constituintes químicos voláteis e não-voláteis de *Moringa oleifera* Lam., Moringaceae. Available in: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-695X2009000600018>. Accessed in February 20th 2017.
- 47 - DOSSIÉ TÉCNICO. Cultivo da Moringa. Available in: <<http://www.respostatecnica.org.br/dossie-tecnico/downloadsDT/Mjc20DU=>>>. Accessed in February 20th 2017.
- 48 - SEMENTES CAIÇARA. Alimentação animal Moringa Oleifera. Available in: <<http://www.sementescaicara.com/downloads/Alimentai/C3/A7/C3/A3o/20Animal/20Moringai/200liofera.pdf>>. Accessed in February 20th 2017.
- 49 - OMAR, Maria. Viabilidade da utilização de plantas nativas da alimentação de peixes de água doce- o caso da Moringa(*Moringa Oleifera* Lam). Na alimentação de tilápias. Available in: <<https://pt.scribd.com/doc/299850891/Viabilidade-Do-Uso-Da-Moringa-Como-Alimento-de-Tilapias-Revisao-Bibliografica>>. Accessed in February 20th 2017.
- 50 - MORETI, Livia; CAMACHO, Franciele; BONGIOVANI, Mileni; STROHER, Ana; NISHI, Letícia; VIEIRA, Angélica; BERGAMASCO, Rosangela. EMPREGO DAS SEMENTES DE MORINGA OLEIFERA LAM, COMO COAGULANTE ALTERNATIVO AO POLICLORETO DEALUMÍNIO (PAC), NO TRATAMENTO DE ÁGUA PARA FINS POTÁVEIS. Available in: <<http://revistas.unibh.br/index.php/dcet/article/viewFile/991/586>>. Accessed in February 20th 2017.
- 51 - Available in: <<http://www.k-state.edu/doddslab/journalarts/dodds/20et/20al/20est/202009.pdf>>. Accessed in November 27th 2016.
- 52 - CCLAUSEN. Tablazo Bay & Maracaibo Lake. Available in: <http://www.cclausen.net/maracaibo_from_space.html>. Accessed in May 5th 2017.



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