6

Project Management Utilities for Sustainable Development and Public Health Protection from Malaria

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Abstract

In this study, useful solutions are presented for managing projects for sustainable development, and public health protection from Malaria due to climate change and particular anthropogenic activities as the analysis is being carried out on renewable energy projects to tackle climate change and protect public health. Proposals for preventive measures, monitoring of water sanitary facilities and measures for avoiding epidemics due to climate change are presented. Useful conclusions are presented in emerging technologies to protect public health, support renewable energy resources projects and defend sustainable development.

Keywords: Project management utilities; malaria; environmental impact assessment; public health; monitoring schemes; water resources; ecological health; geoinformation utilities; sustainable development; sustainable infrastructures.

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1. INTRODUCTION

One of the most critical threats to the environment in the coming century is global climate change. Although the effects on public health are uncertain, we should consider policy argumentation in mitigation and adaptation [1].

Nowadays, despite the growing awareness of the severe issue of climate change, there is still a significant deficit at the level of water conservation cooperation in adopting both integrated and practical strategies to address it [10, 12, 15]. Through the urgent need to mitigate the impacts of climate change, it is proposed to create essential frameworks for the management of hydraulic protection projects within water resources for the sustainable development and protection of public health [23, 24, 26, 27, 28, 34, 36, 37, 38, 43]. Moreover, water quality plays a vital role in the productivity of fish for local communities. Proper geoinformation tools are necessary for surveillance of particular environmental impacts in waterways associated with public health and malaria diseases. Water resources exposed to untreated agricultural, domestic and industrial effluents could cause specific ecological effects in public health that are considered severe pollutants [11, 15, 23, 48, 50, 72, 73, 74, 75].

In this way could be established initiatives and proper tools for public health monitoring and sustainable designs for the protection of environmental resources related to climatic conditions at both the local level of municipalities, and the level of more extensive companies for the protection of water resources against contaminated uncontrolled industrial, sewage toxic emissions in the Mediterranean sea [16, 17, 29, 30, 31, 32, 35, 39, 41, 42].

Malaria is known to be a severe disease that is widely distributed and has a significant health burden all over the world. Its distribution is closely related to climate change that both parasite and vector are sensitive to temperature changes [26, 44, 45, 46]. Unfortunately forecasted future climate might be more-favourable for malaria transmission, especially in tropical regions. Moreover, there are also critical socioeconomic factors: population increase, urbanisation, economic evolution, migration activities should be considered for detailed future risk assessments [13, 14, 15, 40].

The percentage of infected mosquitoes multiplied by the biting rate is a standard parameter by which to estimate the force of infection, that is called the entomological inoculation rate (EIR). Anopheles mosquitoes lay their eggs in water sources in which they develop into larvae and then pupae. Anopheles larvae are found in an extensive range of habitats, including salt- or fresh-water marshes; mangrove swamps; rice fields; rivers and edges of streams next to coastal zones; grassy ditches; and small, temporary rain pools. Most species prefer clean, unpolluted water. Some mosquitoes may prefer specific sites in which to lay eggs, while others use a wide variety of larval habitats (such as temporary groundwater pools, including footprints and ditches, as well as more permanent water sources, such as wells and swamps). The abundance of adult mosquitoes depends on a variety of factors, including the number and size of suitable oviposition sites and the density of the immature mosquito stages at these sites [76].

Several other ecological and environmental factors may influence the adult anopheline population, such as rainfall patterns, temperature, and availability of bloodmeal sources. The larger the mosquito population, the higher the potential number of bites by vectors on humans, birds, unless people take measures to avoid mosquito bites. For a given sporozoite rate, increases in human-biting rate or mosquito density, or both, will result in higher inoculation rates and greater malaria transmission. If the size of the vector population is limited by interventions that reduce the

number of larval habitats or the density of vector larvae per larval habitat, then malaria transmission to humans (with all other factors remaining the same) might potentially be reduced (Figure 1). However, reducing the density of anopheline immature mosquitoes at a larval habitat might have little or no effect on adult numbers because adult numbers may be determined largely or entirely by other factors [76, 77].

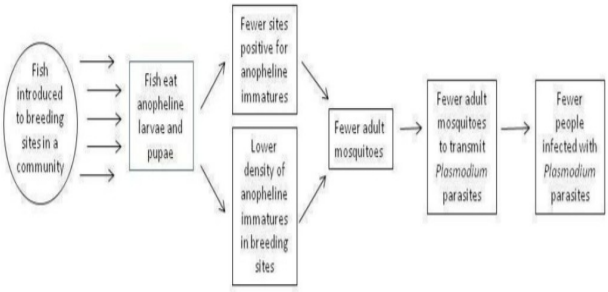

Figure 1. Larvivorous fish for preventing malaria transmission: a conceptual framework. Source: [76]

However, the WHO recommendations from 2012 state that antilarval measures are likely to be cost-effective for control of malaria in areas where the larval habitats are limited in number, permanent, and quickly found (that is, they are "fixed, finite and findable") [78, 79, 80, 81]. The WHO has stated that environmental factors that increase the likelihood that larval control will be effective include cold temperatures that extend for the duration of the immature stages, a short transmission season, and larval habitats that are human-made and homogeneous. In Africa, larviciding is thought to have the best potential to be effective in arid, urban areas and as a possibility in the East African highlands [81].

According to the Cochrane Review of mosquito, LSM indicated that the intervention usually appeared to impact transmission when it was implemented in areas where it was feasible to do so [81]. Whether larvivorous fish are an option for LSM is the subject of this Cochrane Review. Since the 1970s, the WHO has promoted the use of larvivorous fish as an environmentally friendly alternative to insecticide-based interventions for malaria control. Therefore, environmental impacts assessments and project management geoinformation utilities are necessary for surveillance and protection these type of fish securing clean and qualitative water resources. More measures are presented below for malaria disease control, sustainable development and public health protection.

Furthermore, at the company level, the relative proper environmental impact assessment within Carbon Disclosure Project, (CDP) index is one of the most important on the planet, and it monitors the performance of mainly listed companies that want to improve their environmental footprint for sustainable development and public health protection [8, 15, 16, 45, 47, 50, 60]. Efficient project management geoinformation tools are necessary to be appropriately applied for sustainable development protecting public health from the associated environmental impacts.

2. UTILITIES AND METHODS - LITERATURE REVIEW

A crucial useful tool at the state level is the Climate Change Performance Index (CCPI), which aims to enhance transparency at the international standard for each climate policy, but also assesses and compares the efforts of individual countries. Countries to protect the environment [12]. The CCPI focuses on monitoring the performance of countries in 4 categories, resulting in an outcome: 1. GHG Emissions. 2. Renewable Energy Sources (RES). 3. Energy consumption. 4. Climate change policy. Based on the final result, an annual ranking

and four sub-categories are created for each category [12].

Moreover, analysing this year's rankings (2019), we can see in figures 2 and 3 the relative estimated greenhouse gas (GHG) emissions trends related to t CO2 equivalent per capita indicatively for Greece and Egypt [12]. According to the relative report, we can see that Greece has a total score of 50.86 and, climbing 9 places higher than last year, it is in 30th place out of 60. The positions are occupied by 56 countries and European Union, while the three top positions remain vacant, indicating that no country has yet met their coverage criteria for lack of measures to limit global warming to 2 degrees Celsius [12].

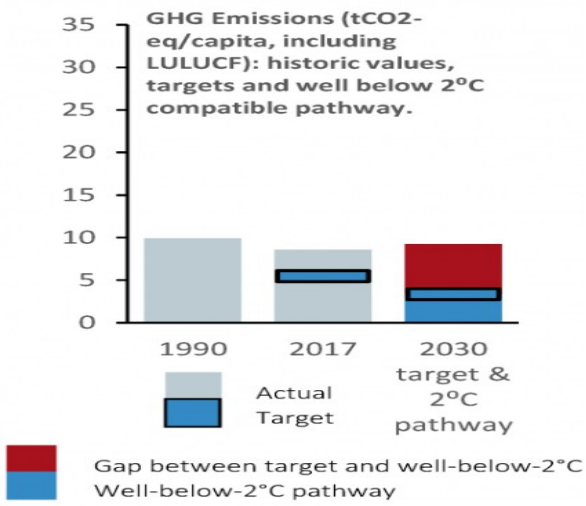

Figure 2. Environmental performance CCPI for Greece in 2019. Source: [12]

While Greece's performance may improve in the category of carbon dioxide emissions (24th position) and renewable energy use (30th position) despite favourable sunshine and wind conditions, Greece's high energy consumption performance (12th) is significant. As well as the fact that Greece presents deficient performance on climate change policy (54th position), it is an essential element stating that the necessary sustainable development projects are necessary to be realised [12]. However, Egypt is in a better position, see figure 3, but can be improved on relatively sustainable development projects recognising new challenges in environmental protection.

Indicatively, both Greece and Egypt could realise sustainable development through the realisation of several efficient projects as they are presented below to be better placed in relation to climate change and the protection of the broader Mediterranean ecosystem, public health protection and ecological, environmental hygiene. Both countries present arid climate during the summer season. Similar measures should be followed by any other located nearby European, African, Asian, Mediterranean countries related to sustainability and public health protection.

Reaching a malaria-free world is related to most of the Sustainable Development Goals (SDGs). Malaria mitigation and elimination will help to benefit from and be a mean to measure any progress towards achieving the SDGs [12, 13, 14]. Malaria is not only a result of development lack but also a cause. Malaria reaches the highest rates in developing countries, with limited development [13, 14, 15].

Proper measures should be taken in both examining countries or any other neighboring countries to be minimised associated diseases by mosquitoes like West Nile virus (WNV) during high weather temperatures, mainly in the summer season. The virus was discovered in Uganda in 1937; it was first detected in North America in 1999 [72]. During the last years, it has been detected in Greece and Egypt [47, 484, 55, 70, 71].

West Nile Virus has been reported in each of Europe, Africa, Asia, Australia, and America [64, 72]. It can occur in outbreaks of disease. A surveillance system in birds is then useful for the early detection of a potential human outbreak [72]. It can be reduced human risk of WNV by using insect repellent and wearing long-sleeved shirts and long pants to prevent mosquito bites. Other measures that should be taken into account are analysed below.

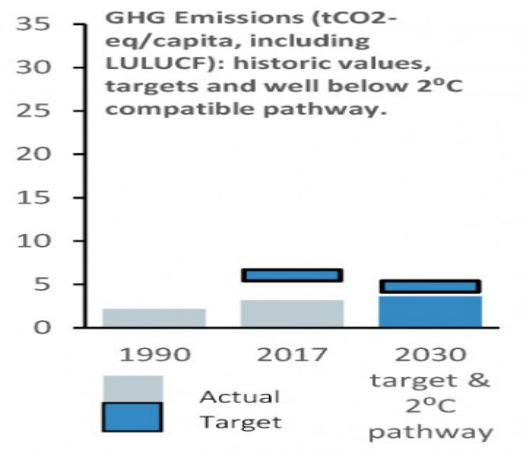

Figure 3. Environmental performance CCPI for Greenhouse missions in Egypt in 2019. Source: [12]

The latter, however, is the most serious, as it requires an effective integrated and practical environmental policy, ecological health policy, renewable energy resources, efficient geoinformation project management utilities, the prevention of indoor pollution, the use of appropriate geoinformatics tools, environmental, ecological hygiene to achieve the public health – environmental health protection. The necessity of infrastructure works for qualitative water resources is vital for the reduction of particular epidemics due to climate change. Correctly applying a practical plan for sustainable development can lead to an improvement of the existing situation [11, 15, 16, 17, 18, 19, 45, 47].

Therefore, the particular energy needs could be supported by renewable energy sources like biogas, hybrid energy systems using photovoltaics, wind turbines, biofuels and biomass's energy. In this way there will be a sustainable development so as to ensure the quality of more extensive ecosystems protecting surface reservoirs, coastlines and estuaries sea from potential pollutants and pathogenic germs within the Mediterranean's sea ecosystem [9, 11, 15, 33, 35, 56, 57, 60]. However, proper, efficient, sustainable designs; clean technologies; geoinformation monitoring utilities are needed within wastewater units as well as landfill biotechnologies for sustainable environmental resources and public health protection [7, 19, 20, 21, 34, 47, 48, 49, 54, 57, 58, 61].

Moreover, according a study that took place between of the 16 countries that eliminated malaria during the decade between 2007 and 2017, the median number of indigenous cases in the 6 years before achieving zero indigenous cases was 212, while in the 3 years before attaining zero indigenous cases, the median was 24 cases (see Figure 4) [64]. Two countries – Sri Lanka and Turkey – had more than 10 000 cases in 2000: in the 3 years before achieving zero indigenous cases, Sri Lanka had a median of 684 indigenous cases, and Turkey had an average of 313 indigenous cases [64].

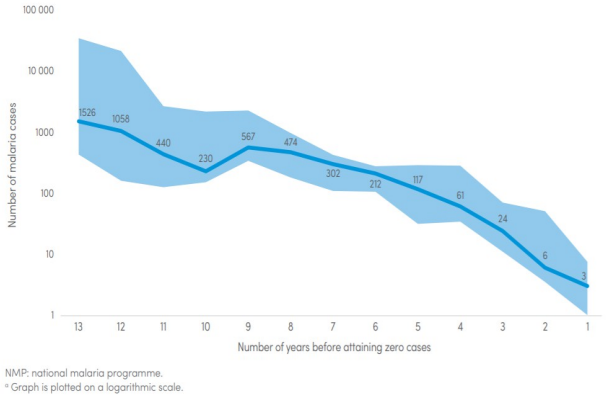

Figure 4. The median number of indigenous malaria cases in the years before attaining zero indigenous cases for 16 countries that eliminated malaria, 2007–2017. Source: [64]

Moreover, the Leishmania species that infect humans are mainly Leishmania donovani, which causes visceral leishmaniasis (VL/kala azar), and Leishmania tropical and Leishmania brasiliensis, which cause cutaneous leishmaniasis [2, 3, 5, 21]. In the human host, Leishmania is

intracellular parasites that infect the mononuclear phagocytes. The spectrum of human disease ranges from the self-healing localised ulcers to widely disseminated progressive lesions of the mucous membranes, skin and the entire reticuloendothelial system. In the Indian subcontinent, Phlebotomus argentipes is the only proven vector for the disease [51, 53, 55, 58, 62, 64].

However, some of the public health problems with Malaria disease due to particular anthropogenic activities as well as due to the climatic change that needs proper project management are the next [47, 48, 55, 64]:

- Malaria diseases;
- Degradation of flora and fauna at lakes or nearby coastlines due to toxic agrochemicals or other uncontrolled releases of particular industrial emissions;
- Indoor pollution and effects in environmental health due to air pollutants; microclimate effects;
- Degradation of water resources due to water pathogens and uncontrolled release of wastewater emissions;
- Efficient, sustainable supply chain project management in health care facilities

The name of the disease is attributed to the belief that malaria was due to the poisonous water vapour cloud that accumulated over the swamps and swamps, which was transmitted, causing people to become ill. Essentially, these sites are the breeding and development sites for mosquito transmitters [34, 47, 51].

The mosquitoes are estimated to fly 1,5 – 2,5 km per hour. The distance they can travel depends on the species of mosquito. Only the female mosquitoes sting. Some mosquitoes prefer humans, or they prefer birds or others which specialise in sucking blood both from birds and humans. Mosquitoes first detect human bodies through their eyes; they observe the movement, then they discover the heat emitted by human bodies. In addition, they can detect various chemical signals, such as carbon dioxide (i.e. breath release). They can track us in a distance up to 35 meters away. A female mosquito can suck about 0.005 grams of blood. In 90 seconds, a mosquito will get 2-3 times its weight [34, 47, 48, 64].

However, not all kinds of mosquitoes transmit the same diseases. For example, some Anopheles mosquito species are responsible for the transmission of malaria. Culex mosquito species transmit West Nile virus, and Dengue fever is responsible for some Aedes species. Other ones are responsible for Kalazar disease mainly due to wastewaters and not a proper operation of cleaning water services [2, 3, 34, 47, 48, 64]. Neither mosquitoes nor other insect species have proven to be capable of transmitting the AIDS virus. [47, 48].

Qualitative water resources are demanded so as to avoid particular pathogens from polluted water; and malaria diseases that exist in Greece during the last years [4, 47, 48, 55, 59]. In general, the measures for mosquitos to secure public health in several countries, especially during summer seasons are the next:

Also, biosensors are useful for monitoring the toxic release of emissions in the environment to take the right measures within community health care centres in time [31, 32, 49, 50, 51, 52, 53, 55, 59]. Moreover, dynamic geoinformation tools are necessary to be appropriately used in combination with particular datasets and other related computational numerical models for the right confrontation of environmental pollution – environmental health problems of associated risks for ecological resources, infrastructure as well as for public health [26, 35, 36, 37, 38, 39, 40, 52, 56, 57].

Furthermore, efficient geoinformation project management tools are necessary like supply chain project management utilities and proper ICT for sustainable development and public health protection due to particular anthropogenic activities

[28, 506, 56, 58, 60, 63, 66].

3. PUBLIC HEALTH FRAMEWORK METHODOLOGY

It is no coincidence, after all presented above, that the Scandinavian countries, which rank best in CCPI rankings, show that not only the most valuable policies but also the measures and decisions taken to protect the environment and public health.

Therefore, it is not only sufficient for E.U member States and Mediterranean sea countries to take action to tackle climate change, but also for our business world to invest in emerging green clean technologies for sustainable development projects that protect public health.

This can be achieved by defining more 'viable' approaches and implementing practices such as measuring and reducing carbon footprint in all medium and large companies, but also by motivating to reduce it.

A prime example of sustainable development is the example of the application of innovative technologies in solid waste management, which generate biomass from waste and supplies almost half the energy required by Oslo city [67, 68, 69].

Similar emerging technologies are particularly needed to meet the needs of irrigation systems, to meet the energy needs of sewage treatment plants and to support the required supply of water to stationary reservoirs to prevent the development of aquatic pathogens related to malaria and associated environmental health symptoms [30, 33, 36, 37, 38, 56, 57, 59, 64].

Climate change is now a reality and scientists have sounded the alarm and time is starting to count down already. It is therefore essential, in addition to the announcements, to lay down stringent laws, standards and guidelines that will set the new framework for protecting the hygiene of the environment, the sound management of development projects and the reduction of pollutants emitted to protect public health.

A relative public health framework is presented below in figure 5 so as to be taken into account the following sustainable development projects and measures to tackle climate change, ensure the quality of the hygiene environment, public health and protect ecological health. Relative geoinformation project management utilities are necessary for sustainable development, environmental, ecological health and public health protection [4, 10, 33, 56, 59, 60, 65, 67].

Presented below are the necessary protection public health sanitary engineering - mechanical measures against epidemiological diseases due to mosquitos in residential, health centres and the surrounding areas.

- Water in fountains or similar structures will have to be replaced at least once a week. Also the saucers in pots should be emptied at regular time intervals;
- objects that clog wastewater collection should be removed so that no stagnant water accumulates in drainage systems, wells and at other particular hydraulic wastewater collection facilities;
- retaining walls and drainage constructions for topsoil protection at particular ecological infrastructures due to heavy rains and storms due to climatic change;
- fire protection zones; individual construction facilities for water supply; road and hydraulic designs in emergencies; protection of associated ecological health infrastructures next to coasts, rivers, forests, lakes other natural environmental health tourism facilities and related building infrastructures;
- pumping water out of long term unused pools – water reservoirs and removing water that is

often held in place by the covers that are placed on them;

- mosquito net laying screening systems at windows and doors at building infrastructures;
- operation of air conditioning systems contributes to mosquito's reduction in indoor places within building infrastructures;
- use of proper electrical heated chemical tablets or other types of certified chemicals (i.e. DEET, IR 3535 etc.), aerosols for mosquito's reduction at indoor or outdoor places;
- use of proper plastic mosquito nets or by other materials;
- use of appropriate wearing clothes for protection from mosquitos;
- support efficient landfill biotechnologies; clean technologies; quality management utilities; monitoring schemes, ICTs & IoTs.

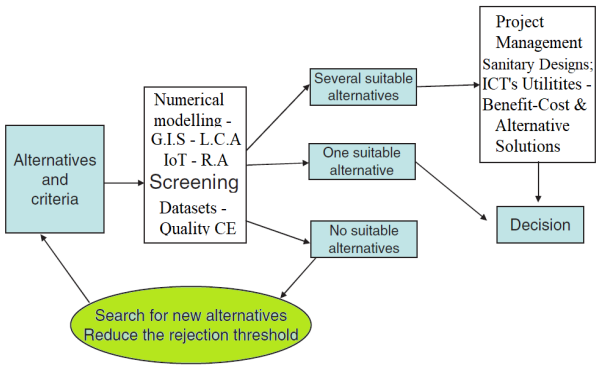

Figure 5. Framework for proper use of project management geoinformation utilities for ecological, environmental health and qualitative public health

The above-described measures, as they presented in figure 5, should be taken into account in order to tackle climate change effects related to public health, qualitative water resources to ensure the quality of the hygiene environment, ecological health and protect particular environmental facilities at associated community health infrastructures.

4. CONCLUSIONS

Based on the above-presented framework will be useful to enable proper quality infrastructures. They could be helpful design infrastructures in development of innovative hydraulic projects for sustainable development, medical tourism, and efficient green construction infrastructures in recreational projects for unique ecologically travel destinations next to forests, lakes or coastal water resources.

In this way, relatively organised facilities supporting could be supported using ecological tourism, therapeutic sports activities and qualitative health care facilities. Therefore, the latter facilities will be necessary, especially for older people, with various health problems, protecting public health and sustainable development in particular forms of local communities. Based on the above new jobs could be for sustainable development within distinct ecological infrastructures and security of public health.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest between them.

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