

# Orunmila Project Report

Project ID: 60055b63ea13d2271811c9c3

Project Title: This is the project

Total Articles: 9 Accepted Articles: 7 Rejected Articles: 2

## Accepted Articles:

---

### Article Title:

Characterization of food gels prepared from the water extract of fish (*Cyprinus carpio* L.) scales: From molecular components to sensory attributes

### Abstract:

Food gels prepared from the water extract of fish scales (WEFS) are described in this study. The effects of WEFS, sucrose, and NaCl concentration on gel formation and stability, gel texture, and gel sensory attributes were evaluated. The results indicated that an increase in WEFS concentration led to increases in the formation rate, stability, and texture of the gel. Addition of a moderate amount of sucrose (2%–3%, w/v) and NaCl (0.4%–0.6%, w/v) improved the stability, gumminess, chewiness, and cohesiveness of the gel. However, the addition of an excessive amount of sucrose (>4%, w/v) and NaCl (>0.8%, w/v) decreased the stability, gel strength, adhesiveness, and springiness of the gel. The sensory attributes of fish scales (FS) gels were mainly affected by WEFS concentration. On the basis of combined textural analysis and sensory evaluation, the FS gels formed with 4% WEFS, 3% sucrose, or 0.4% NaCl was proposed in this study. The gel microstructure and water distribution obviously showed an apparent variation, together with a change in the structure of FS gels. Competing hydrophilic forces and electrostatic interactions varied with sucrose and NaCl concentration, altering the structure and water distribution of FS gels. © 2020 Elsevier Ltd

,

---

### Article Title:

An explorative assessment of environmental and nutritional benefits of introducing low-carbon meals to Barcelona schools

### Abstract:

Shifting to plant-based and low-carbon diets is a key measure for climate change mitigation. In this regard, national and local governments are setting goals and actions to tackle this issue. The municipality of Barcelona has set an intervention for the academic year 2020-21: introducing low-carbon meals in public schools. This study assesses the environmental and nutritional benefits of this intervention by applying the Life Cycle Assessment (LCA) methodology, with an energy and nutritional functional unit; and combined it with the Water-Energy-Food (WEF) nexus approach, by considering three WEF resources-based impacts (Blue Water Footprint (BWF), Primary Energy Demand (PED) and Land Use (LU)) and the Global Warming Potential (GWP). The transition to a low-carbon meal would reduce between 46 and 60% the environmental impacts. These benefits could even be higher when extra interventions within the school boundaries are applied. More research in behavioural change is needed in order to evaluate both: the acceptance of the new menus by scholars and the adaptation of the school kitchen staff to the new menu. Finally, it is suggested to monitor the environmental and nutritional changes of the introduction of low-carbon meals within the school menus in an integrated way. © 2020 Elsevier B.V.

---

### Article Title:

Chemical oxygen demand with APHA/AWWA/WEF 5220 D procedure for high concentration adapted to micro-volume [La Demanda Química de Oxígeno con el procedimiento APHA/AWWA/WEF 5220 D para rango alto adaptado a micro-escala]

### Abstract:

In this study, linearity and precision tests were performed for the determination of the Chemical Oxygen Demand (COD) in water, for a micro-volume adaptation of the closed reflux method for small volume for high range of APHA / AWWA / WEF. The main objective of the work was to demonstrate that it is possible to obtain adequate measurements by adapting the APHA / AWWA / WEF method 5220 D, a widely used international reference for determining COD in water, on a micro-volume adaptation. The micro-volume adapted method required only changes in the concentration of each substance in the digestion solution, but not in the silver sulfate catalyst solution, so that the concentration of each of these substances in the tubes digestion was almost equal to that corresponding to the original method (except for mercury sulfate, which was deliberately reduced). In the micro-volume adaptation presented here, the dosed volumes of all liquid reagents were measured using class A volumetric pipettes, improving the precision of measurements with respect to the use of both graduated and plunger pipettes (necessary to carry out the original method). The results obtained for the micro-volume adaptation demonstrated excellent linear fitting and precision of the system. © 2021 Instituto Mexicano de Tecnología del Agua. All rights reserved.

---

### Article Title:

Water-energy-food security nexus based selection of energy recovery from wastewater treatment technologies: An extended decision making framework under intuitionistic fuzzy environment

### **Abstract:**

According to the increasing demand of human society to the electrical energy, the choice of a comprehensive decision making for energy recovery from wastewater treatment technologies selection is very important. Water-energy-food (WEF) security nexus which is one of the most notable concepts in recent years that have emerged in research across many disciplines, can be used as a decision making tool to evaluate actions in different energy sectors. Behbahan city in the southwest of Iran has been chosen for the experiment. An extended methodology based on two multi-criteria decision making (MCDM) methods called entropy and linear assignment under intuitionistic fuzzy environment has been chosen to support the synthetic decision to prioritize energy recovery from wastewater treatment technologies. Thirteen criteria including water security principles (Access, Safety, and Affordability), energy security principles (Availability, Accessibility, Affordability, Acceptability, Applicability, and Adaptability) and food security principles (Availability, Access, Utilization, and Stability) have been considered. In terms of the warm and dry weather in Behbahan city, choosing the up-flow anaerobic sludge blanket reactor (UASB) option as the most appropriate option seems rational. The anaerobic baffled reactor (ABR), micro-algae cultivation (MAC), and microbial fuel cells (MFC) options were selected as the second, third, and fourth options, respectively. © 2020 Elsevier Ltd

---

### **Article Title:**

Quantitative simulation of the water-energy-food (WEF) security nexus in a local planning context in Indonesia

### **Abstract:**

## Orunmila Project Report

The process of planning and evaluation for local development, especially in the critical sectors of water, energy and food (WEF) should be conducted using a holistic, integrated approach in an attempt to bring the improvement in water, energy and food security in a region. System dynamics models are one of the tools for simulation and assessment of the system-wide impacts caused by local interventions. This research develops a stock-flow diagram (SFD) of WEF security in a local context to be used in analysing the impacts of implementing three planned policy interventions in Karawang Regency, Indonesia. STELLA Professional software is employed to build the SFD and conduct simulation of the WEF security nexus, and is based on a previously developed qualitative causal loop model of the same system (the Karawang WEF security (K-WEFS) model). In the quantitative SFD, four scenarios are developed and assessed in this study; (i) population growth changes; (ii) agricultural land conversion rate changes; (iii) changes in the development of artificial ponds and solar energy; and (iv) per-capita resource consumption changes. The results show several interesting findings related to the WEF security nexus, available resources per person (APP) and self-sufficiency levels (SSL) of resources in business as usual conditions and under planned interventions. Potentially unanticipated detrimental indirect impacts of policy interventions are highlighted. This dynamic support tool could be applied in other local regions to improve the evaluation and planning process of water, energy and food sectors in a holistic manner. ♦ 2020 Institution of Chemical Engineers

---

### Article Title:

Trade-offs and synergies in the water-energy-food nexus: The case of Saskatchewan, Canada

### Abstract:

Socioeconomic and climatic changes and limited water resources pose various challenges to water, energy, and food sectors across the globe. The inevitable interactions between water, energy, and food systems bring about trade-offs but also synergies under different decisions and policies. To gain insights into these issues, we developed a water-energy-food (WEF) nexus model that incorporates both production (supply) and demands sides of WEF systems into a single system-of-systems model using the system dynamics (SD) approach. The model is applied to Saskatchewan, Canada, and so is named WEF-Sask. The model results reveal the various levels of sensitivities of water, energy, and food (and feed) sectors to the socioeconomic and climatic drivers. The analysis of trade-offs and synergies shows that the proposed large irrigation expansion (400%) boosts food production by 1.6% while reducing hydropower production by 2.7% in Saskatchewan. Wind expansion strategy (from 5% to 30% of total capacity) makes synergies that not only contribute to electricity supply but also reduce greenhouse gas emissions, industrial water demand, and groundwater use by 2.0, 5.7, and 3.8%, respectively. Biofuel use (blending mandate: 10% ethanol and 5% biodiesel) in transportation cuts GHG emissions by 1.2% but reduces the potential food export (food surplus) by 5.0%. The WEF-Sask model allows for scenario analysis toward integrated resources management, and its generic model structure can be expanded to other regions. ♦ 2020 Elsevier B.V.

---

**Article Title:**

The conceptual basis of water-energy-food nexus governance: systematic literature review using network and discourse analysis

**Abstract:**

In the last decade, the debate on the governance of water, energy, and food (WEF) has intensified, spurring the emergence of the term **nexus governance**. In general, the reduction of trade-offs and construction of synergies between WEF have been placed on the scientific, political, and economic agenda. However, although increasingly used, it is difficult to find a clear meaning and definition of what the term represents. Based on a systematic literature review (SLR), using text-mining and machine learning algorithms, this article investigates what are the conceptual basis of the nexus governance debate, and attempts to clarify the main themes, networks, and gaps within this literature. The analysis is based on quantitative and qualitative methods, combining social network analysis (SNA) and discourse analysis (DA). The results highlighted that twenty-four governance-related concepts support this literature, breaking down into eight groups: water and basin governance; environmental and systems governance; risk and resource security governance; economic governance; global governance; urban governance; integrative and cooperative governance; and **epistemic** and transdisciplinary governance. © 2020 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.