NATURALISTA CAMPANO
ISSN: 1827-7160
Volume 28 Issue 1, 2024

Study of Environmental Problems of Environmental Protection of the Southern Surkhandarya Region Using Physical Methods

O. A. Niyazova[1], Kh. H. Turaev[2], Z. E. Dzhumaeva[3], E.Yu. Turaev[4], M. P. Kholmurodov[5]

[1,2,3,4,5]Termez State University, Uzbekistan

Abstract: In this article, the composition of atmospheric air in the areas of the city of Termez and the region of Surkhandarya region was studied using physical methods using indicators such as changes in the environmental situation in the regions, atmospheric pressure, wind speed, temperature and direction. Stationary sites have been identified for conducting field studies of environmental problems and their impacts in the southern regions, and air samples are illustrated with scientifically based results.

Keywords: Air temperature, atmospheric pressure, wind speed, wind temperature, wind direction, wind energy, coordinates, climate, altitude, meteorological.

1. Introduction

Atmospheric air in residential areas is one of the important factors that determine the state of health and performance of the human body. Therefore, in order to reduce the negative effects of the physical factors of the atmospheric air on the human body in any situation, it is one of the urgent problems to achieve the optimal conditions of this environment or to achieve indicators that do not cause negative consequences even when exposed to the human body for a long time. In the Curkhondarya region, the change in the atmospheric air has been showing its effects on the people and plants living in the region. As a result of sharp climate change, i.e. decrease of precipitation and extremely high air temperature, the profitability of agricultural products is decreasing. Studies were conducted in order to study the current state of atmospheric air and to give an ecological assessment based on the obtained results.

According to R.A.Merino and M.I.Gasman, reference evapotranspiration is a variable used to describe the evaporation demand of the atmosphere and its effect on the water balance. As a result of their research, significant variations were observed during the last decades, especially in the mid-latitudes. These variations are mainly studied as changes in atmospheric indicators such as solar radiation, vapor pressure deficit or wind speed in local areas where people live. In their study, annual and seasonal environmental indicators were studied. Ground weather stations for the Argentina region of South America were established and data from the last four decades (1981–2020) were reanalyzed. According to the data, the contribution of aerodynamic and radiative effects was evaluated to analyze their driving role. Significant positive trends are observed from the reanalysis data, with values up to 10−1 mm/yr across Argentina, especially in the central-eastern side of the Andes. Most of the above changes corresponded to positive trends in air temperature in the study area, while in the central Andes they corresponded to negative trends in dew point temperature. On the other hand, it has been found that the increase in energy availability through positive trends in net surface radiation has produced slightly higher yields in the northern regions of the country. Regional values were shown to be more sensitive to changes in air temperature in northeastern regions, but noted that changes in humidity and solar radiation may also play a role. Given that climate change is expected to increase temperatures and precipitation in the central and northeastern regions of the country and decrease in the eastern side of the Andes in the coming decades, the features observed during 1981–2020 are expected to intensify in the near future [1].

According to U. Uzupis and others, to understand the fluctuation of physical processes, it is necessary to analyze many physical parameters: atmospheric and soil temperature, gas concentration (O2, CO2 and ethylene), soil fertility, its dependence on its composition, wind speed on the height and density of plants, soil moisture , it was determined that the change in the ability of plants to reflect light depends on the surface of the earth, the vegetation period and other factors. Their experiments were carried out using data collection in accordance with the National Forest Vegetation Monitoring Program. Cultivated areas were taken as the purpose of inspection.

According to the data, humidity, pressure, gas concentration, solar intensity, wind speed and temperature changes were obtained with the help of modern methods. The effect on plant growth was evaluated based on the results of various research data. All selected data sets should be used to analyze the environmental factors of climate change. Soil texture has been shown to affect moisture content, and this has been shown to affect plant growth, oxygen production, and nitrogen retention. have found that measuring properties that affect fluid storage and transport, such as macroporosity, can provide soil quality indices that help recommend appropriate soil management systems [2].

According to the research results of E. Klimas et al., in order to understand the fluctuation of physical processes in the agro environment, it is necessary to analyze many physical parameters, including atmospheric and soil temperature, gas concentration (O2, CO2, etc.), soil density, wind dependence, plant growth, soil moisture , it is necessary to study the speed according to the vegetation period and other factors. Their experiments were conducted using data collection in accordance with the National Forest Health Program Monitoring Program. Cultivated areas were taken as the purpose of inspection. Indicators such as humidity, pressure, gas concentration, solar intensity, wind speed and temperature were determined in the data. The data were collected in cultivated grasslands with different fertilizers and cultivated fields in different geographical locations. Experimental data confirm that the average meteorological data obtained from the State Meteorological Stations cannot be considered unambiguously as environmental factors in a wide area of initial and different soil vegetation. According to the obtained data, it is proved that it should be used in the analysis of environmental factors of climate change [3].

An in-depth study of E. Supriyadi's research can be applied today to predict any phenomena, for example, the weather of the region. One of them is the LSTM (Long short-term memory) method, which is suitable for use with time series data types. His research conducted deep learning of 200-layer LSTM, studied on test data with a ratio of 9:1, measured RMSE (Root mean square error) and RMSE update validation value, and also predicted some weather parameters after several days. The data used consists of measurements of air temperature, humidity, wind speed and air pressure in January-February 2019. January data was used as training and test data to validate the prediction, and February data was used as comparison. The predicted results for LSTM deep learning show that the forecast RMSE for all weather parameters is proven to be better when using LSTM with update. The RMSE obtained for temperature, relative humidity, wind speed, and air pressure was updated to 0.576; 2.8687; 2.1963 and found to be 1.0647 respectively. One day (February 1, 2019) forecast of air temperature, wind speed and air pressure is 1.0337; 6.3413; 2 are found to be 8934 and 1.4313 respectively. Of all the weather parameters, only temperature and humidity parameters increase in RMSE with time, while parameters such as wind speed and air pressure decrease on the third day and continuously increase during the following month [4].

According to A. Parasyris and others, the choice of places of recreation largely depends on climatic conditions. Nowadays, as the effects of extreme climate change are increasing, the need for accurate weather and climate services for hotels is very important. Such a service can be useful for future planning of tourist activities and destinations, as well as for hotel managers, because it can help to make decisions about planning and expanding the tourist season due to long-term high temperature predictions, which will increase the income of companies in the local tourism sector. came The purpose of their work is to calculate forecasts of meteorological variables using statistical methods and artificial intelligence (SI) for a given area of interest using insitu meteorological station data and produce the most valuable and reliable localized forecasts. In their study, they answered the question of the most appropriate method for predicting time periodicity data from a single meteorological station located at a specific location; in their case, the temporal resolution of actual measurements at a hotel in northern Crete, Greece, was 3 h, and the prediction limit considered here was up to 2 days. SI methods such as seasonal autoregressive integrated moving average (MAIHO'), long-short-term memory neural network, and a hybrid combination of both have been used as forecasting methods. Unlike the single-variable MAIHO, several meteorological variables such as temperature, relative humidity, atmospheric pressure, and wind speed are taken as input for LSTM(long short-term memory) and hybrid methodologies. Two benchmark methods were used to compare and quantify the additional predictability, namely the climate forecast and the robustness model, which showed significant improvement over these simpler forecasting methods, especially on single-day data. Their results show that the studied hybrid methodology performed best on temperature and wind speed data and closely followed MAIHO', while LSTM(long short term memory) performed better on humidity data even after correction to the hybrid MAIHO' model. Finally, they discussed and introduced various hybrid methodologies to further improve meteorological predictions [5].

There are several reports of near-surface wind speeds according to Richmond-Navarro et al. In their research, the work presented a model for measuring wind speed at a height of 4 m above the ground, based on year-round measurements in two meteorological towers. Each tower is equipped with five height anemometers, as well as

thermometers and pressure and relative humidity sensors. The data were processed using Eureqa artificial intelligence software, which identified functional relationships between variables using an evolutionary search technique called symbolic regression. Using their technique, models were found for each month studied in which altitude and temperature were the variables that most affected wind speed. The model that best predicted the measured wind speed was then selected. A polynomial function directly proportional to height and temperature was identified as the function that provided the best data for mean wind speed in the rough sublayer. They finally identified future work to test the model elsewhere [6].

I. Kirbas and A. According to Kerem's work, wind energy has taken an important place in renewable energy sources. The biggest challenges in wind energy production are the variability of the wind and the difficulty of estimating the actual wind speed. In their study, 25,777 wind measurements were taken from the Mehmet Akif Ersoy University campus. The records included meteorological data such as wind speed, wind direction, temperature, pressure, and humidity at various altitudes. Multilayer perceptron and radial basis function methods were used to estimate the potential wind speed at 61 m. In the application phase, 100 artificial neural networks were trained and the performance of these networks was evaluated. The obtained results show that the 61 m wind speed can be estimated with 99% accuracy using an artificial neural network when other meteorological data are included [7].

According to I.Caglayan et al., the determination of wind energy potential was achieved by spot measurement. The MERRA (modern era retrospective analysis for research and applications) program produced by NASA provided the point data values. Point data using Windographer software gave the theoretical potential energy of the wind turbines in a short period of time. In this study, Kojaeli University campus selected the point where wind turbines are planned to be implemented. The output power obtained from wind energy has been verified. They used MERRA software and Windographer software for this energy production study. Analysis of wind speed and direction was carried out within 1 hour at some points using the MERRA program. Windographer automatically determines wind source data such as wind speed, standard deviation, vertical wind speed, direction, temperature, pressure and relative humidity. Point "B" is selected among the 4 point coordinates correctly determined by the software. The annual wind data of point "B" was analyzed and the annual amount of energy was calculated. They used GE 1.7-100 wind turbine in this research work. The produced energy and the output power of the turbine were calculated with the Windographer program [8].

R.M. who investigated the development of a hybrid model for day-1 to 46-day wind speed forecasting in Northeast Brazil, based on the results of Campos et al. The forecast system is associated with the widely used digital weather forecast from the ECMWF (European Center for Medium-Range Weather Forecasts) global ensemble data, studied using local measurements. The main focus of this research is processing of NT (neural networks) in terms of data structure, dimensionality, architecture, training strategy and verification. Multilayer neural networks are built using the following parameters: wind indicators, information about temperature, humidity and atmospheric pressure, as well as latitude, longitude, time unit and forecast period. It is found that the main NT output consists of wind speed residuals, i.e., the difference between the ECMWF arithmetic ensemble mean and the observations. The simplicity and small size of the NT model has the potential to significantly improve detection and prediction. According to the ECMWF, the wind speed was found to be between 0.3 and 1.4 m/s, the original curve fit values between 0.1 and 0.1 m/s, while the mean air error was reduced to 10-30% . It has been shown that the detailed evaluation system has a significant generalization ability and robustness, and low computational cost [9].

In the work of E. Yu. Toraev and G. F. Raimov, the results of the study of the natural ecological problem "Afghan wind" using physical methods and its impact on the national economy are highlighted with scientifically based results [10].

2. Discussion and Results

The data and results obtained from the territories of Termiz city and district, which is the southern part of Surkhandarya region, show that there are natural and artificial environmental problems of regional scale. The climate conditions and geographical environment in the southern region of Surkhandarya region are very different from the northern region. The city of Termiz and the regions of the district also have their own environmental problems, and solving them is an urgent issue today. The main ecological problem in the southern regions is the sudden change of the air atmosphere. Based on the study of the impact of this environmental problem on the national economy and the determination of the laws of atmospheric air dynamics, it is important to review and make changes in the stationary points where this environmental problem occurs, as well as to study the impact of this environmental problem on the human factor.

Atmospheric air pollution causes the ozone layer to emit harmful ultraviolet radiation and spread to the earth's

surface, which is of great importance. One of the reasons for the change in the atmosphere today is the depletion of the ozone (O3) layer. The environment is constantly changing and this problem cannot be ignored. In the study of this problem, using physical research methods, the following equipment was used to study the composition of the atmosphere.
MULTI-PURPOSE ANEMOMETER is designed to measure air temperature, humidity, wind temperature, water vapor, wind speed and direction, atmospheric pressure, altitude, solar exposure and indoor illumination.

Table 1 Indicator of wind speed, temperature, direction and atmospheric pressure in the air of Termiz city in July-August (2023)

	Location address	Wind speed M/s	Wind temperature C^o	Wind direction	Pressure hPa
1	"Amusokhil" neighborhood	2,7	35,1	From north to east	970,5
2	"Joyjangal" neighborhood from Diydar wedding hall	1	38,2	From east to south	968,6
3	"Majnuntol" neighborhood	2,3	34.75	From west to east	970,45
4	"Al-Jami" neighborhood	1,6	33,5	From west to east	970,7
5	"Joyjangal" neighborhood from around the DSP plant	1,6	22.4	From north to east	969,9
6	"Guliston" neighborhood	0,9	40,9	From east to west	977
7	Sakhavat neighborhood	1,65	35,4	From north to east	970,1
8	The "Uzbekistan" neighborhood is from TerDU	1,23	33,63	From north to east	968,7
9	"Bogishamol" neighborhood	1,6	35,3	From east to south	967,8
10	Alisher Navoi neighborhood	1,1	32,9	From north to east	976,3

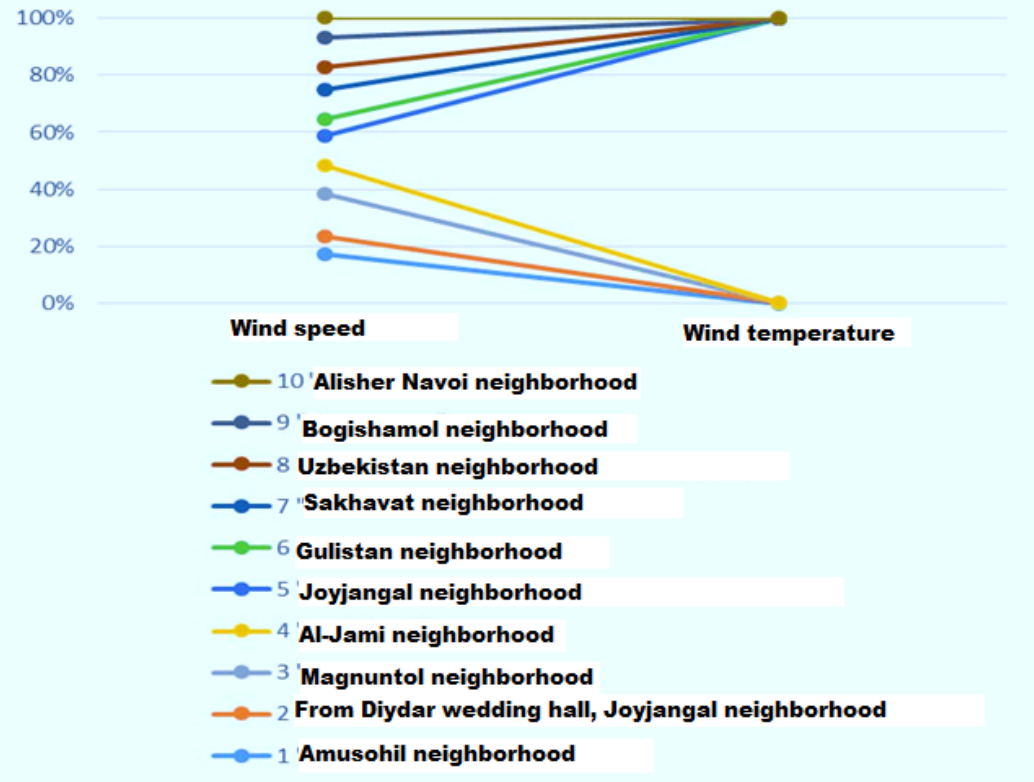

Figure 1. Wind speed and wind temperature curves obtained in Termiz city.

Figure 1 shows that the temperature of the wind in the city of Termiz changed dramatically with respect to the wind speed. In the neighborhoods of "Al-Jamiy", "Majnuntol", "Joyjangal", "Amusohil" the wind temperature dropped sharply compared to the wind speed, and "Joyjangal", "Guliston", "Sakhavat", "Uzbekistan", "Bugishamol", "Alisher Navoi" it can be seen that the wind temperature in the neighborhoods has increased sharply compared to the wind speed.

Table 2 Indicator of wind speed, temperature, direction and pressure in the air of Termiz district in July-August (2023)

	Location address	Wind speed M/s	Wind temperature C°	Wind direction	Pressure hPa
1	"Amusokhil" neighborhood	2,7	35,1	From north to east	970,5
2	"Joyjangal" neighborhood from Diydar wedding hall	1	38,2	From east to south	968,6
3	"Majnuntol" neighborhood	2,3	34.75	From west to east	970,45
4	"Al-Jami" neighborhood	1,6	33,5	From west to east	970,7
5	"Joyjangal" neighborhood from around the DSP plant	1,6	22.4	From north to east	969,9
6	"Guliston" neighborhood	0,9	40,9	From east to west	977

7	Sakhavat neighborhood	1,65	35,4	From north to east	970,1
8	The "Uzbekistan" neighborhood is from TerDU	1,23	33,63	From north to east	968,7
9	"Bogishamol" neighborhood	1,6	35,3	From east to south	967,8
10	Alisher Navoi neighborhood	1,1	32,9	From north to east	976,3

It shows that the temperature of the wind in the Termiz district has changed sharply in relation to the wind speed. In "Joyjangal" neighborhood, wind speed increased sharply compared to "Termiz" neighborhood, wind speed decreased sharply in "Quyoshli Yurt" neighborhood, and in "At-Termizi", "Soliabad", "Navroz" neighborhoods, wind speed almost did not change, but in "Sh.Rashidov" neighborhood, wind speed increased sharply, the wind speed did not change in "Kungirot" "Soliabad" neighborhoods, it can be seen that the wind speed decreased in "Cabzipoya" neighborhood. The wind temperature did not change in all areas of the neighborhood.

Summary. Based on the application of physical methods in the study of the properties of atmospheric air, environmental problems, the results were obtained by studying the atmospheric pressure, wind speed, temperature, direction with the help of MULTI-PURPOSE ANEMOMETER, THERMOMETER, Portable Multi-gas Detector devices. Atmospheric pressure, wind speed, temperature, direction in Termiz city and districts were studied and analyzed on the basis of a graph. According to the obtained results, it was observed that the temperature of the wind depends on the wind speed in the city and district of Termiz. In the city of Termiz, a sharp change of wind temperature depending on the wind speed is observed, while in the Termiz district, it was found that the wind temperature depends on the wind speed.

3. References

1. Merino, R. A. & Gassmann, M. I. Trends of reference evapotranspiration and its physical drivers in southern South America //Int. J. Climatol. 43, (2023).
2. 2.Uzupis, A., Nemciauskas, K. & Balezentiene, L. Investigation of Batiotic Parameters in-Situ of Cultivated Grassland, Using Physical Measuring Methods //Aict2010 - Appl. Inf. Commun. Technol. Proc. 4th Int. Sci. Conf. (2010).
3. Uzupis, A., Nemciauskas, K., Balezentiene, L. & Klimas, E. Application of Physical Indices at Field Scale Crop Management //Rural Dev. Glob. Dust. Vol 5, P. 1 5, (2011).
4. Supriyadi, E. DEEP LEARNING USING LONG-SHORT TERM MEMORY (LSTM) FOR PREDICTION PARAMETER CUACA // J. Meteorol. from Geophys. 21, (2021).
5. Parasyris, A., Alexandrakis, G., Kozyrakis, G. V., Spanoudaki, K. & Kampanis, N. A. Predicting Meteorological Variables on Local Level with SARIMA, LSTM and Hybrid Techniques // Atmosphere (Basel). 13, (2022).
6. Richmond-Navarro, G., Montenegro-Montero, M., Casanova-Treto, P., Hernández-Castro, F. & Monge-Fallas, J. Roughness sub-layer wind speed model for tropical wooded areas //Wind Most. 46, (2022).
7. Kirbas, I. & Kerem, A. Short-Term Wind Speed Prediction Based on Artificial Neural Network Models // Measurement and Control, l July, 2016, Vol. 49, No. 6, R.183-190.
8. Caglayan, I., Tikiz, I., Turkmen, A. C., Celik, C. & Soyhan, G. (Gulsen). Analysis of wind energy potential; A case study of Kocaeli University campus // Fuel 253, (2019). DOI: 10.1016/j.fuel.2019.05.123
9. Campos, R.M.; Palmeira, R. M. J.; Pereira, H.P.P.; Azevedo, L.C. Mid-to-Long Range Wind Forecast in Brazil Using Numerical Modeling and Neural Networks //Wind 2022, 2, 221–245. https://doi.org/10.3390/ wind2020013
10. Toraev E.Yu., Raimov G'.F. Environmental problems in the northern regions of Surkhandarya region and physical methods of their study // Materials of the republic scientific-practical conference. - Termiz, 2014, pp. 479-481.