

NATIONAL BOTANICAL GARDEN OF GEORGIA – RECREATIONAL - SANITATION OASIS OF TBILISI CITY

*Amiranashvili A.G., *Bliadze T.G., *Chikhladze V.A.,
**Saakashvili N.M., **Tarkhan-Mouravi I.D.,
***Sikharulidze Sh.A., ***Lachashvili N.I.

*Mikheil Nodia Institute of Geophysics of Ivane Javakhishvili Tbilisi State University
**Tbilisi Balneological Health Resort - Practical-Scientific Center of Physiotherapy,
Rehabilitation and Medical Tourism of Georgia
***Institute of Botanic of Ilia University

1. INTRODUCTION

The climate of Tbilisi can be classified as moderately humid subtropical. The city's climate is influenced both by dry (Central Asian/Siberian) air masses from the east and humid subtropical (Atlantic/Black Sea) air masses from the west. Tbilisi experiences relatively cold winters and hot summers. Because the city is bounded on most sides by mountain ranges, the close proximity to large bodies of water (Black and Caspian Seas) and the fact that the Greater Caucasus Mountain Range (further to the north) blocks the intrusion of cold air masses from Russia, Tbilisi has a relatively mild micro-climate compared to other cities that possess a similar continental climate along the same latitudes. Vakhushti Bagrationi wrote that the climate of Tbilisi is excellent and is pleasant. Summer occurs hot, but not no tolerated. Autumn and spring are excellent and cheerful [1, 2].

Together with this Tbilisi is industrial city with the appropriate negative influence on the climate. Urban structures, road communications and coatings, transport, etc. introduce essential influence on the background climate of city (islands of heat, air pollution, the disturbance of the wind regime, etc.). Therefore very important is the study of the microclimatic special features of the existing and promising recreational zones both inside the city and in its environments. These zones must be easily attainable for the majority of the population of Tbilisi city and its guests, and also possess properties for leisure, tourism, rehabilitation of health, and at best - for the treatment.

On the basis of that indicated above we have decided to conduct the preliminary analyses of the air equivalent-effective temperature (EET) on the territory of National Botanical Garden of Georgia (or Tbilisi Botanical Garden). Tbilisi botanical garden exists almost 400 years and this is one of the most dear places for the inhabitants of city and the guests of the Georgian Capital [3]. EET is the important bioclimatic characteristic, connected with the health of people [4].

2. METHOD AND DATA DESCRIPTION

Work gives the results of two day measurements for Tbilisi Botanical Garden. The measurements of temperature, relative humidity of air and wind speed were conducted with the use of a portable meteorological station. Calculation of EET was matched with the procedure, described in [5]. 30.07.2011 the measurements of the meteorological parameters at 25 points in territory 90 hectare (1125x802 m) of Botanical Garden were carried out. 2.08.2011 these measurements at 33 points in territory 1152 m² (72x16 m) near the main waterfall were carried out. The comparison of data of EET for the Botanical Garden with analogous data for the territory of the Institute of Geophysics, Tortoise Lake and Pasanauri were carried out.

3. RESULTS

The results in fig. 1-4 are given. Distribution of EET in Tbilisi Botanical Garden 30.07.2011 in fig. 1 is given. As follows from fig. 1 the values of max EET varied from 24.3° to 26.8° (gradation - "Warmly", favorably for human health [4]). The smallest values of EET near the main waterfall and under the bridge of Tamara were observed (24.3° and 24.5° respectively).

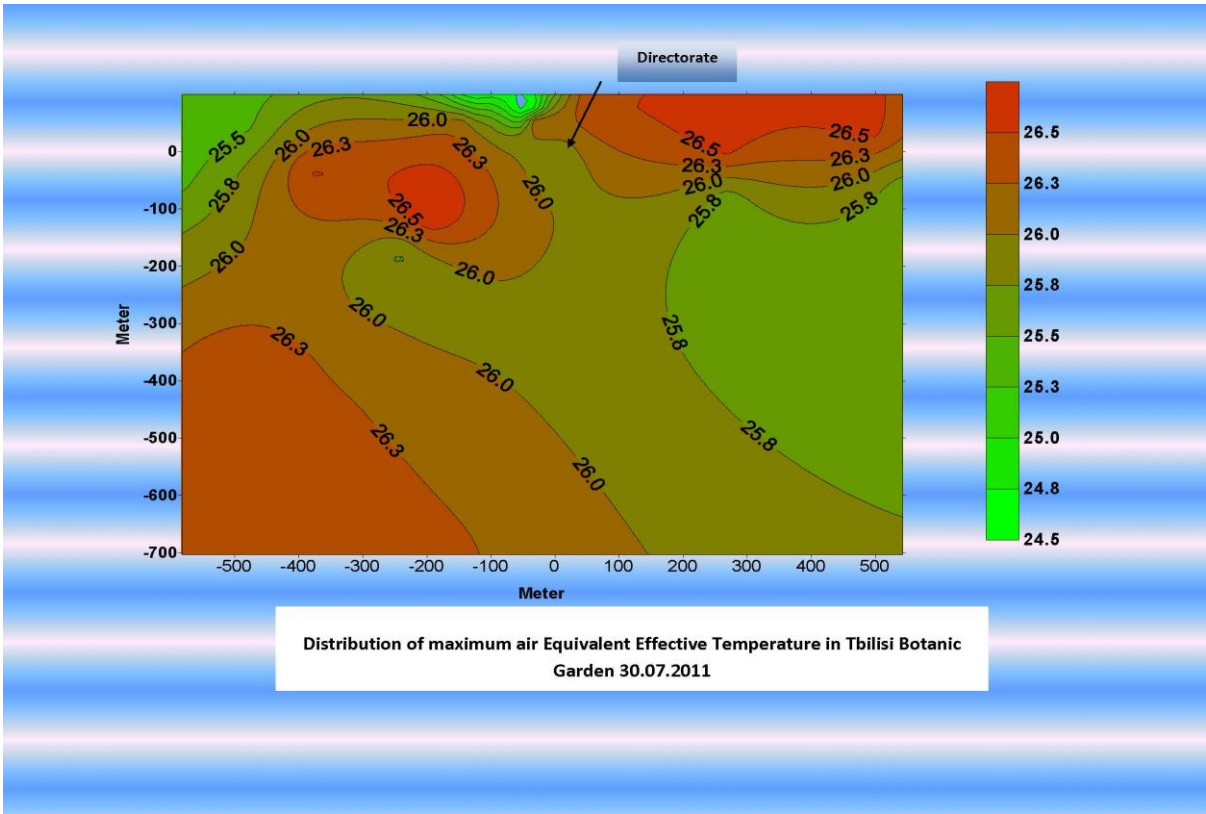


Fig. 1

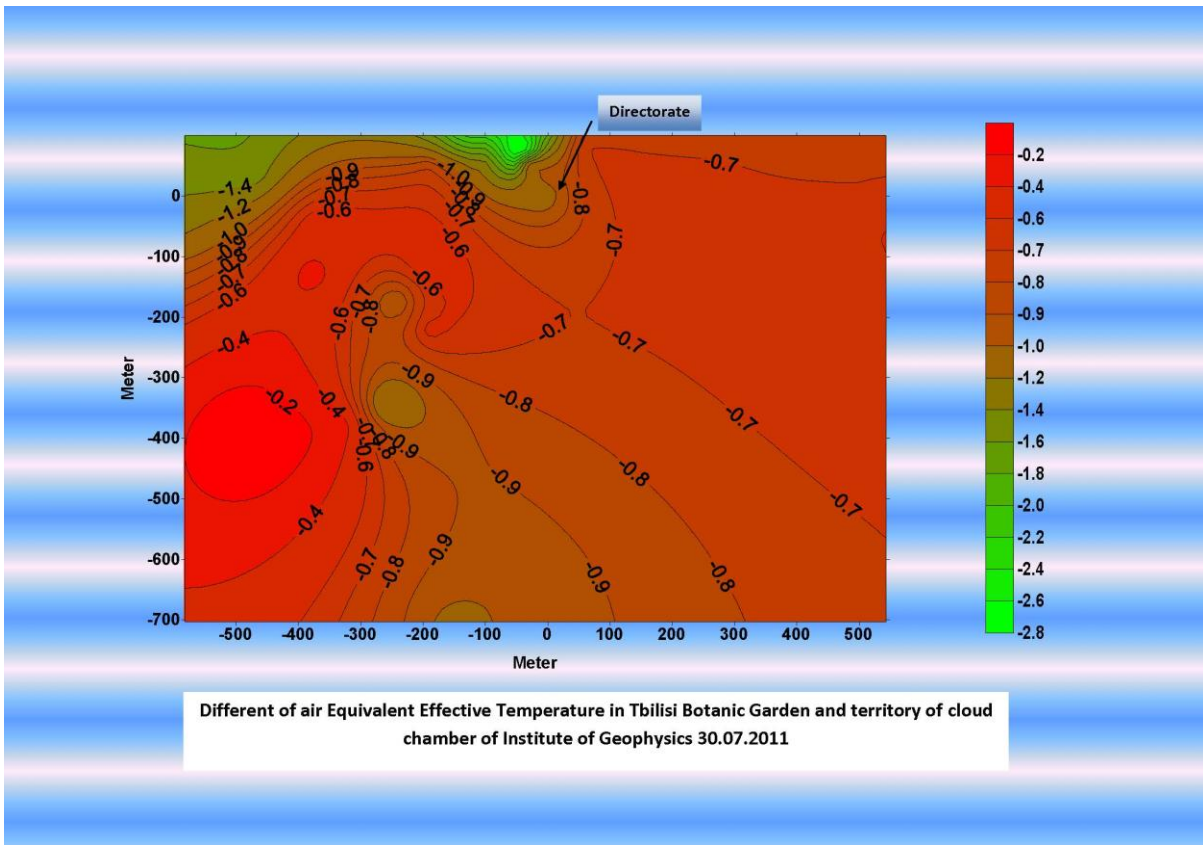


Fig. 2

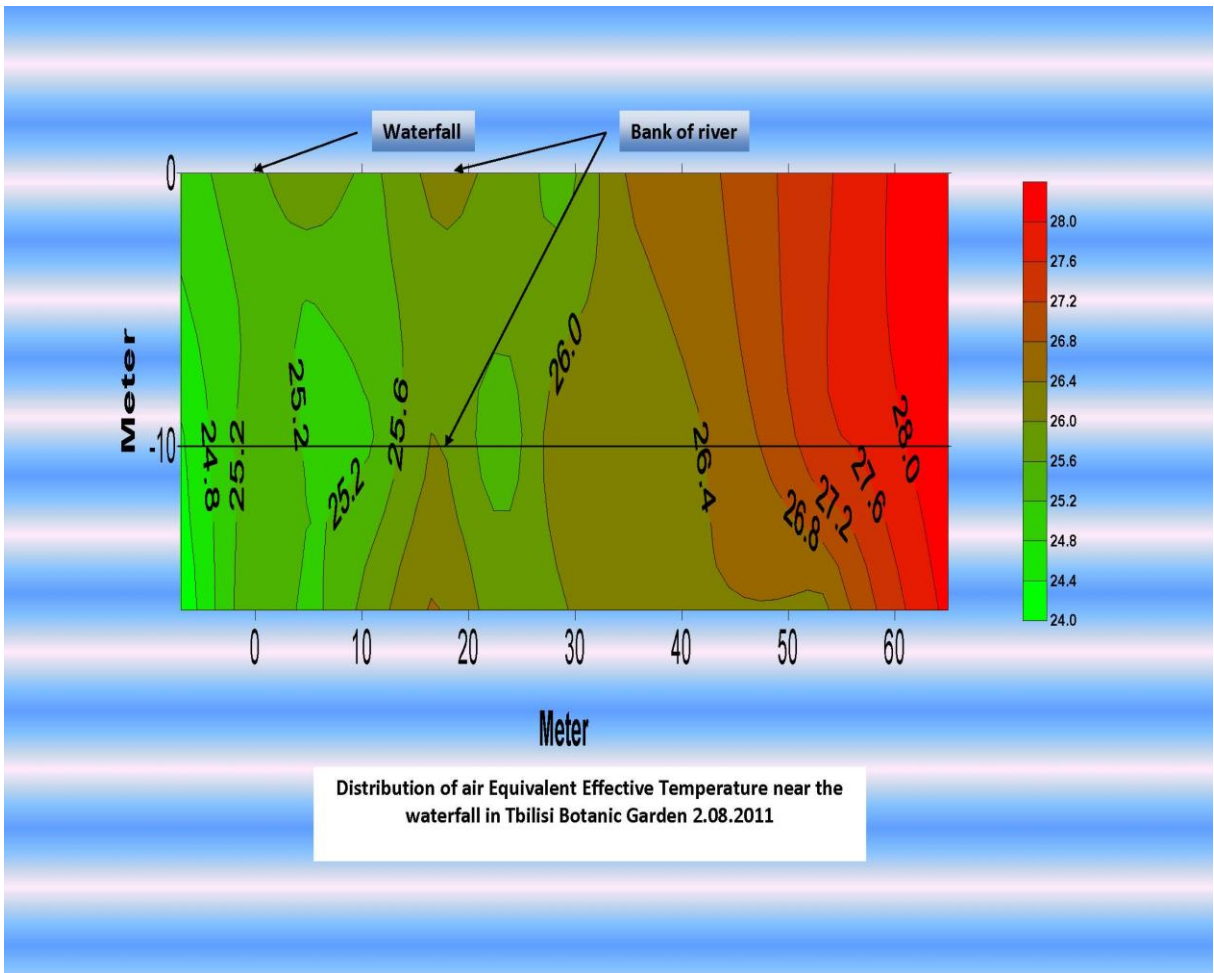


Fig. 3

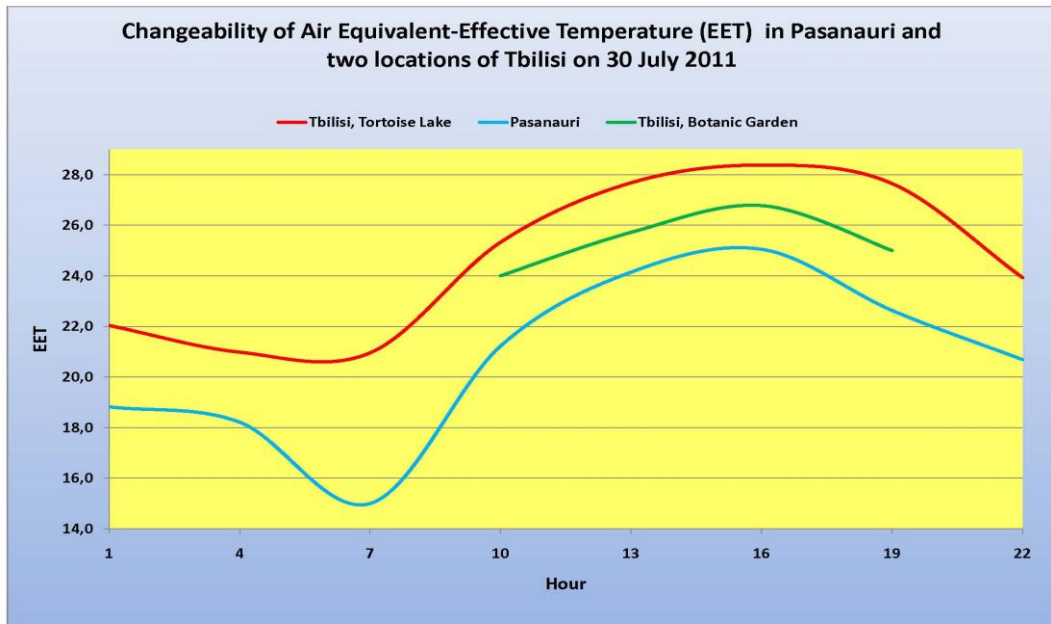


Fig. 4

The data of different of EET in Botanic Garden and territory of Cloud Chamber of Institute of Geophysics in fig. 2 is given. The value of this difference changes from -3.1° to 0° . Let us note that for the usual temperature of air this difference changes from -5.5°C to 1.5°C .

Distribution of EET near the main waterfall of Tbilisi Botanical Garden 30.07.2011 in fig. 3 is given. As follows from this figure the values of EET varied from 24.1° to 28.4° . Thus, at the small distance near the waterfall (60 m) the value of EET cover two gradations: "Warmly" and "Hotly". High values of EET above the heated stones were observed.

Changeability of EET in Botanic Garden, Tortoise Lake and Pasaauri in fig. 4 are presented. As follows from this figure, in the day time value of EET in Botanical Garden is more than in Pasaauri, and it is less than in the Tortoise Lake. From 13 to 19 hour value of EET in the territory of Botanical Garden correspond to gradation "Warmly", and Tortoise Lake - "Hotly".

Thus in the hot weather the territory of Botanical Garden is unique oasis with acceptable for the health Equivalent- Effective Temperature of air. In the future the more detailed mapping of EET values is expedient. This will make it possible to determine special zones for leisure, rehabilitations and treatment of people in combination with other useful properties of garden (ion therapy, phyto therapy, aerotherapy, etc.).

4. CONCLUSIONS

The maps of distribution of Equivalent-Effective Temperature (EET) on the territory of National Botanical Garden of Georgia and main waterfall are made. In the day time value of EET in Botanical Garden is more than in Pasaauri, and it is less than in the territory of Institute of Geophysics and Tortoise Lake. In the hot weather the territory of Botanical Garden is unique oasis with acceptable for the health values of EET.

5. REFERENCES

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რეზიუმე

საქართველოს ეროვნული ბოტანიკური ბაღი – ძალაძე თბილისის რეკრეაციულ-ბამაჯანსაღებელი ოაზისი

ამირანაშვილი ა., ბლიაძე თ., ჩიხლაძე ვ.,
სააკაშვილი ნ., ხატიაშვილი ე., თარხან-მოურავი ი.,
სინარულიძე შ., ლაჩაშვილი ნ.

ჰაერის ექვივალენტური ეფექტური ტემპერატურა (ეეტ) წარმოადგენს მნიშვნელოვან ბიოკლიმატურ მახასიათებელს, რომელიც კავშირშია ადამიანების ჯანმრთელობასთან. მოყვანილია წინასწარი კვლევების მონაცემები ეეტ-ის შესახებ საქართველოს ეროვნული ბოტანიკური ბაღის ტერიტორიაზე (2011 წლის ივლისი-აგვისტო).

ბოტანიკური ბაღის და მთავარი ჩანჩქერის ტერიტორიისათვის აგებულია ეკტ-ის განაწილების რუკები. ეკტ-ის განაწილება არაერთგვაროვანია და იცვლება 24.3°-დან 26.8°-დე (გრადაცია “თბილა”, ადამიანის ჯანმრთელობისათვის ხელსაყრელი პირობა). ქალაქის სხვა უბნებში (გეოფიზიკის ინსტიტუტი და კუს ტბის ტერიტორია) ეკტ-ის მნიშვნელობა აღემატებოდა 27° (გრადაცია “ცხელა”, ადამიანის ჯანმრთელობისათვის არახელსაყრელი პირობა). განსაკუთრებით ხელსაყრელი თერმული პირობები შეინიშნება მთავარი ჩანჩქერის მახლობლად და თამარის ხიდის ქვემოდ მდინარე წავკისის მიდამოებში.

შემდგომში მიზანშეწონილია ჩატარდეს ეკტ-ის უფრო დეტალური კარტირებისა. ეს საშუალებას მოგვცემს დასვენებისათვის, რეაბილიტაციისათვის და ადამიანების მკურნალობისათვის განისაზღვროს სპეციალური ზონები ბაღის სხვა სასარგებლო თვისებებთან ერთობლიობაში (იონოთერაპია, ფიტოტერაპია, აეროტერაპია და სხვა).

Abstract

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The air equivalent-effective temperature (EET) is the important bioclimatic characteristic, connected with the health of people. The data of preliminary studies of EET on the territory of National Botanical Garden Georgia (July-August of 2011 years) are represented.

The maps of distribution of EET on the territory of garden and main waterfall are made. Distribution of EET has uneven nature and changes from 24.3° to 26.8° (gradation - "Warmly", favorably for human health). In other parts of the city (territory of the Institute of Geophysics and Tortoise Lake) the value of EET exceeded 27° (gradation "Hotly", unfavorable for human health). Especially favorable thermal conditions near the main waterfall and under the bridge of Tamara near Tsavkisi river are observed.

In the future the more detailed mapping of EET values is expedient. This will make it possible to determine special zones for leisure, rehabilitations and treatment of people in combination with other useful properties of garden (ionotherapy, phytotherapy, aerotherapy, etc.).

Резюме

НАЦИОНАЛЬНЫЙ БОТАНИЧЕСКИЙ САД ГРУЗИИ – РЕКРЕАЦИОННО- ОЗДОРОВИТЕЛЬНЫЙ ОАЗИС ГОРОДА ТБИЛИСИ

**Амиранашвили А.Г., Блиадзе Т.Г., Чихладзе В.А.,
Саакашвили Н.М., Тархан-Моурави И.Д.,
Сихарулидзе Ш.А., Лачашвили Н.И**

Эквивалентно-эффективная температура воздуха (ЕЕТ), является важной биоклиматической характеристикой, связанной со здоровьем людей. Представлены данные предварительных исследований ЕЕТ на территории национального ботанического сада Грузии (июль-август 2011 года).

Построены карты распределения ЕЕТ на территории сада и главного водопада. Распределение ЕЕТ имеет неравномерный характер и меняется от 24.3° до 26.8° (градация “Тепло”, благоприятно для здоровья человека). В других частях города (территория Института геофизики и Черепашье озеро) значение ЕЕТ превышало 27° (градация “Жарко”, неблагоприятно для здоровья человека). Особенно благоприятные термические условия наблюдаются вблизи главного водопада и под мостом Тамары около реки Цавкиси.

В будущем целесообразно более детальное картирование значений ЕЕТ. Это позволит определить специальные зоны для отдыха, реабилитации и лечения людей в сочетании с другими полезными свойствами сада (ионотерапия, фитотерапия, аэротерапия и др.)