

## Appendix

### **The list of variables in the data set *bioclim***

BIO 1 - the annual average temperature;  
BIO2 – the average daily temperature;  
BIO3 - isothermal (BIO2/BIO7 \* 100);  
BIO4 - seasonal temperatures (standard deviation \* 100);  
BIO5 - the maximum temperature of the warmest month;  
BIO6 –the minimum temperature of the coldest month;  
BIO7 - the annual temperature range (BIO5 - BIO6);  
BIO8 –the average temperature of the wettest quarter;  
BIO9 –the average temperature of the driest quarter;  
BIO10 –the average temperature of the warmest quarter;  
BIO11 –the average temperature of the coldest quarter;  
BIO12 - the annual average of precipitation;  
BIO13 –precipitation in the wettest month;  
BIO14 –precipitation of the driest month;  
BIO15 - seasonal rainfall (coefficient of variation);  
BIO16 – precipitation of the wettest quarter;  
BIO17 – precipitation of the driest quarter;  
BIO18 – precipitation of the warmest quarter;  
BIO19 – precipitation of the coldest quarter.

### **The list of land cover's categories**

0 - water;  
1 - evergreen coniferous forests;  
2 - evergreen broad-leaved forests;  
3 - deciduous coniferous forests;  
4 - deciduous broad-leaved forests;  
5 - mixed forests;  
6 - thick bushes;  
7 – rare bushes;  
8 –the wooded savannah;  
9 - savannah;  
10 - meadows;  
11 - permanent wetlands;  
12 - arable land;  
13 - urban and built-up areas;  
14 - mixed arable land and natural vegetation;  
15 - the snow and ice;  
16 - barren lands and wastelands.

### **The list of administrative regions of Kazakhstan, falling within each of the four risk zones**

1. The zone of high risk: Aktobe region (Temir, Uilsky areas), Almaty (Almaty), East-Kazakhstan oblast (Borodulikha, Urjar), Zhambyl (Baizak, Zhambyl), West Kazakhstan region (Akzhayik, Burlinsky, Dzhangalinsky, Dzhanibeksky, Zelenovskiy, Kaztalovsky, Karatobinsky, Syrymsky, Taskalinsky, Terektinsky, Urda, Chingirlausky), Kostanay (Altynsarinsky, Denisovsky, Karabalyk, Karasu, Mendykarinsky, Sarykol, Taranovsky, Uzunkolsky, Fedorov areas Kostanay), North Kazakhstan (Timiryazevskiy), South South Kazakhstan region (Baydybeksky, Maktaaral, Sairam and Tyulkubasky areas Shymkent).

2. Zone of average risk: Akmola region (Akkol, Arshalynsky, Esilsky, Zhaksynsky, Zharkainy, Korgalzhyn, Egindykolsky, Enbekshildersky, Ereymengausky areas), Aktobe region (Bayganinsky, Kargalinsky, Martuk, Mugalzhar, Hobdinsky, Khromtau District and Aktobe) Almaty region (Aksusky, Alakol, Zhambyl, Ili, Karatal, Kerbulak, Koku, Panfilov, Sarkand, Uygur, Enbekshikazahsky), Atyrau (Zhulyoysky, Inder, Isatai, Kzylkoginsky, Kurmangazy, makhambet district and the city of Atyrau), East-Kazakhstan Region (Abay, Ayagozsky, Beskaragai, Glubokovsky, Zharna, Leninogorsk, Semipalatinsk, Shemonayhinsky), Zhambyl (Zhualynskiy, Zhulaysky, Kordai, Lugovskoy, Merke, Moyinkum, Talas, Shuisky), Karaganda region (Abay, Bukhara-Zhyrausky, Nura, Osakarovsky), Kostanay (Amangeldy, Arkalyk, Auliekolsky, Dzhangildinsky, Zhitikara, Kamystin, Naurzum), Mangistau region (Tupkaragai area and Aktau), Pavlodar region (Aktogay, Akshuysky, Lebyazhye, May, Pavlodar, Sherbaktinsky), North Kazakhstan region (Aiyrtau, Akzhayik, Bulaevskii, Esilsky, Zhambyl, Kyzylzhar, Mamlyutsky, Soviet, Taynshinsky, Ualihanovsky, Tselinny, Shal-Akunsky), South Kazakhstan (Kazygurt, Ordabasy, Tolebi, Turkestan).
3. Zone of low risk: Akmola region (Astrakhan, Atbasar, Bulandinsky, Zerenda, Sandyktau, Tselinograd, Shortandy, Shchuchin areas), Aktobe region (Aytekebiysky, Algynsky, Irgiz, Shalkar), Almaty oblast (Balkhash, Karasai, Talgar, Taldykorgan) , Atyrau (Makat), East-Kazakhstan oblast (Zaisan, Zyryanovsk, Kokpekty, Kurchum, Tarbagatai, Ulan), Zhambyl (Sarysu), Karaganda region (Aktogay, Zhanaarkinsky, Ulytau, cereal growing), Kyzylorda region (Zhanakorgan, Terenzheksky), Mangistau region (Beyneusky, Mangistau), Pavlodar region (Bayanaul, Zhelezinka, Irtys, Kashira, Assumption, with Ekibastuz), South Kazakhstan (Arys, Otrarsky, Saryagash, Shardara).
4. The zone of negligible risk: Almaty region (Raiymbek District), East-Kazakhstan oblast (Caton-Karagayskiy), Karaganda region (Karkaraly), Kyzylorda region (Aral, Zhalagash, Kazaly, Karmakchinsky, Shiely and Kyzylorda) Mangistau region (Karakiya) and South Kazakhstan oblast (Sozak).