



REPORT
ON PROJECT ACTIVITY IN 2017
BY SOLODKIY G.F.

Project manager, Prof.

V.A.Dukhovniy

Responsible for position **3.1.2.3.**

G.F.Solodkiy

Scenarios presented by

Sh.Kh.Muminov

Approved by

A.Sorokin

3.1.2.3. Scenario-based calculations of crop water requirements in the context of climate change for 2016-2055

The calculations were made for the base period, BAU, FSD and ESA

BAU (2) – Business as usual

FSD (3) – Food security and diet change

ESA (4) – Export-oriented sustainable adaptation

The calculations were made on the basis of earlier estimated monthly crop water requirements (with consideration of climate change) for the time period from 2000 to 2050 for five planning zones located in the area of the Amudarya River. The planning zones located in Uzbekistan were selected only since there was no relevant data on other zones.

Annex 1 shows scenarios and water requirement calculations. The column diagram of crop distribution contains non-filled columns for the data of 2016 and filled columns for the data of 2050.

3.1.2.7. Optimization methodology, input data, and analysis of results

Here, the optimization object, optimization objectives, and necessary input data were determined.

All those items were coordinated directly with the executor of optimization – Timur Kadyrov. Input data on scenarios, crops, and water use rates were submitted to the executor.

Thus, what does the optimization problem mean in our context? Since we deal with water, we should optimize irrigation water. This means producing maximum benefits from water used. This must be done within development scenarios in Uzbekistan. Hence, the less water we spend per unit production, the more output we can produce.

As to scenarios,

The first scenario is business as usual or ‘no change’ scenario. It implies proportional expansion of crop areas and because of its ‘no change’ character is not subjected to optimization.

The second scenario is food security and diet change. Here is a wide space for optimization; however, construction of target functions is connected with great uncertainties. Food production is closely linked with national cuisine and replacement of some foodstuff with another one could not be accepted by residents. For example, replacement of rice with joughara. Rice consumes a lot of water in time of its growing, whereas joughara virtually grows in non-irrigated conditions. Hence, optimization of water is feasible; however, this would require huge efforts to study nutrition preferences of population, equivalence of replacement of one crop with another one, and collection of data on crop calorificity. I think that this task cannot be solved within the framework of given project.

And the third scenario of export-oriented sustainable adaptation. In this case, everything is more or less clear. The optimization criterion could be water productivity, i.e. the ratio of the cost of produced output (crop) to amount of water used for production of this crop. As such, this could be the target function. As to the cost of agricultural output, one should orient to country-consumers of such output. The largest market for the Uzbek agricultural producer is Russia in view of sanctions and climate of the Russian Federation. Additionally, after the visit of the Uzbek President to Russia, the statement was issued on gradual reorientation of republican agricultural production to export (melons, tomato, fruits and vegetables). Thus, this scenario is very well suited for optimization.

Forecast indicators of the Bukhara planning zone (PZ) until 2050

Demographics:

		Reported period		BAU		FSD		ESA	
		2010	2015.	2020	2050	2020	2050	2020	2050
Total population, ths people		1,684	1,815	1,940	2,855	1,940	2.855	1,940	2,855

Irrigated area

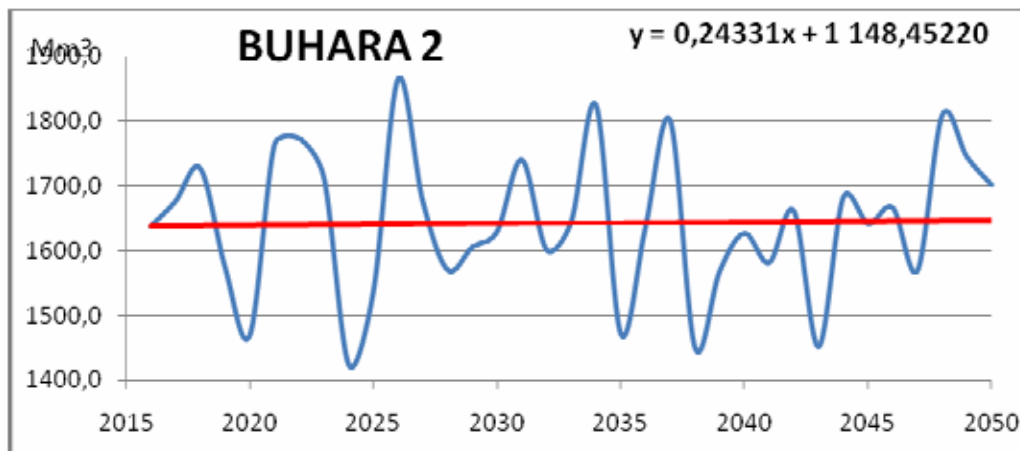
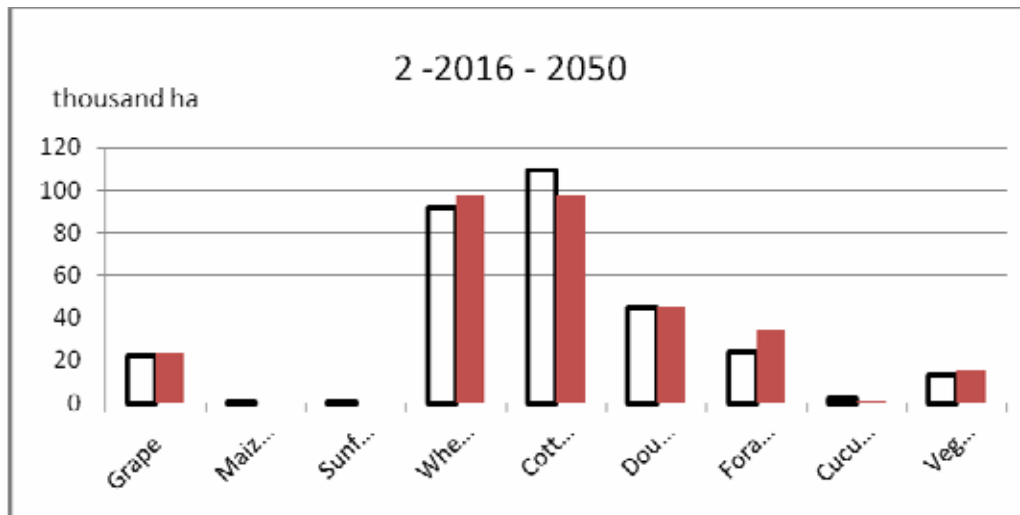
	Crop ID	Reported period		BAU		FSD		ESA	
		2010	2015	2020	2050	2020	2050	2020	2050
Irrigated area, ths ha		261.9	261.7	263.3	268.1	260.9	265.0	260.9	265.0
cotton	37	110.4	110.3	106.2	97.0	100.3	66.3	100.3	68.9
forage	300	24.1	23.3	26.8	33.8	26.4	39.8	26.4	31.8
wheat	20	91.9	91.6	93.4	97.2	86.6	66.3	86.6	63.6
maize	11	0.7	0.3	0.3	0.1	0.4	8.0	0.4	5.3
cucurbits	301	2.2	1.9	1.8	1.0	2.0	8.0	2.0	13.3
vegetables	302	11.8	12.7	12.9	15.6	22.2	39.8	22.2	39.8
orchard/grape	7	20.7	21.6	22.0	23.3	23.0	37.1	23.0	42.4
Other – sunflower	18	0.7	0.3	0.3	0.1	0.4	8.0	0.4	5.3
Double season crop:	200	45.1	45.1	45.1	45.1	45.1	45.1	45.1	45.1
Vegetables	231	31.57	31.57	31.57	31.57	31.57	31.57	31.57	31.57
Maize for silage	239	13.53	13.53	13.53	13.53	13.53	13.53	13.53	13.53

BUKHARA PZ

BAU

Water delivery, Mm3

Year	Mm3
2016	1637.6
2017	1676.1
2018	1726.5
2019	1574.1
2020	1469.5
2021	1763.4
2022	1773.1
2023	1712.3
2024	1424.3
2025	1537.2
2026	1864.7
2027	1675.5
2028	1570.2
2029	1605.2
2030	1629.1
2031	1739.9
2032	1601.0
2033	1644.7
2034	1824.1
2035	1472.1
2036	1636.4
2037	1800.1
2038	1450.9
2039	1568.2
2040	1626.7
2041	1581.2
2042	1660.8
2043	1452.0
2044	1681.9
2045	1641.1
2046	1666.0
2047	1569.2
2048	1808.6
2049	1744.1
2050	1700.8

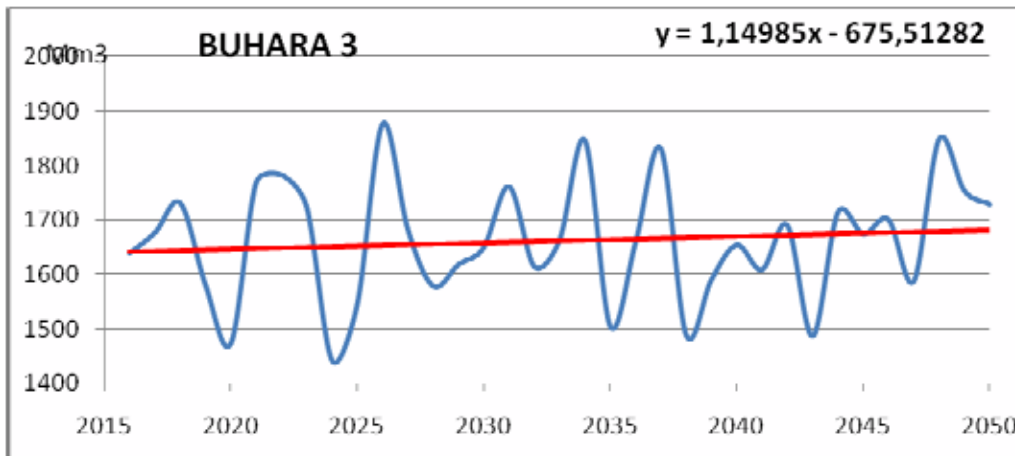
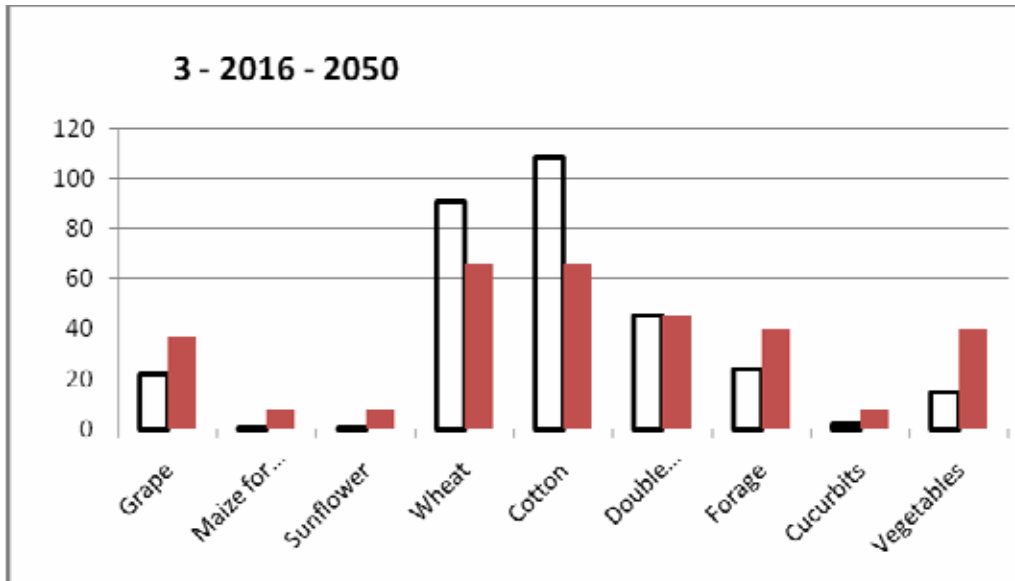


Crop area, ths ha

Year	Crop	Ths ha
2016	7	21.70534
2016	11	0.3
2016	18	0.333491
2016	20	91.92865
2016	37	109.48
2016	200	45.1
2016	300	24.01133
2016	301	1.840886
2016	302	12.72315
2050	7	23.29124
2050	11	0.1
2050	18	0.069211
2050	20	97.22513
2050	37	97
2050	200	45.1
2050	300	33.81805
2050	301	1.01389
2050	302	15.63605

Annual water delivery, Mm3

Year	Mm3
2016	1638.98302
2017	1676.47959
2018	1731.34396
2019	1580.23534
2020	1472.70322
2021	1769.08354
2022	1783.42879
2023	1723.84201
2024	1441.23042
2025	1545.20081
2026	1877.03672
2027	1682.37563
2028	1578.22181
2029	1618.11441
2030	1649.60416
2031	1761.90971
2032	1613.98264
2033	1663.515
2034	1846.83474
2035	1504.28248
2036	1658.37785
2037	1831.52657
2038	1488.67278
2039	1590.28049
2040	1654.11495
2041	1608.79356
2042	1690.3411
2043	1485.95705
2044	1714.44499
2045	1674.12784
2046	1700.91736
2047	1587.08353
2048	1848.96637
2049	1753.90605
2050	1728.91003



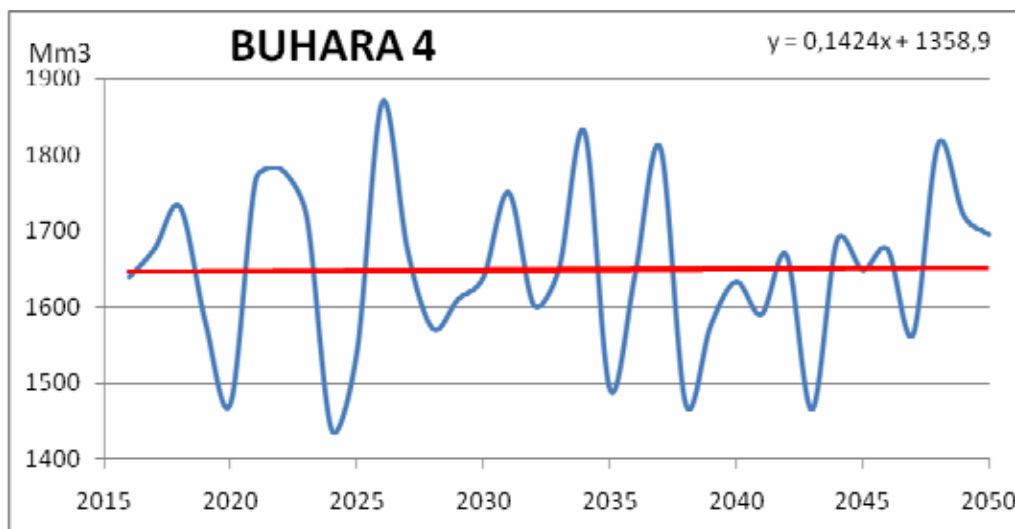
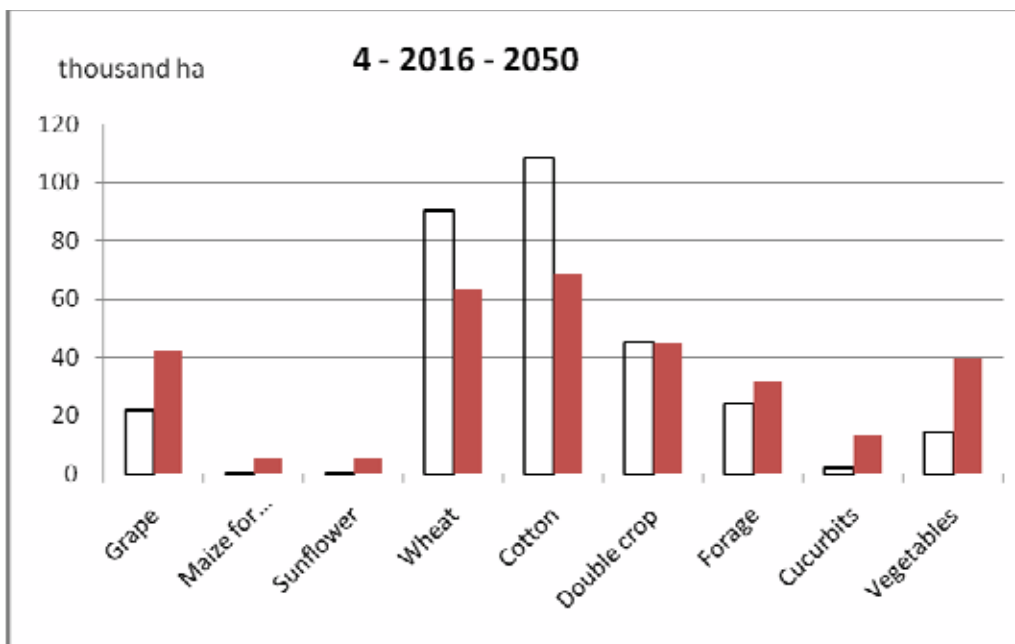
Crop area, ths ha

Year	Crop	Ths ha
2016	7	21.923
2016	11	0.32
2016	18	0.359
2016	20	90.557
2016	37	108.3
2016	200	45.1
2016	300	23.936
2016	301	1.88
2016	302	14.575
2050	7	37.1
2050	11	8
2050	18	7.95
2050	20	66.25
2050	37	66.3
2050	200	45.1
2050	300	39.75
2050	301	7.95
2050	302	39.75

Annual water delivery,

Mm3

Year	Mm3
2016	1638.983
2017	1676.48
2018	1731.344
2019	1580.235
2020	1472.703
2021	1767.992
2022	1780.917
2023	1720.615
2024	1438.036
2025	1540.334
2026	1869.055
2027	1674.958
2028	1571.378
2029	1609.768
2030	1638.483
2031	1750.349
2032	1602.002
2033	1650.801
2034	1830.471
2035	1492.08
2036	1641.726
2037	1809.581
2038	1472.754
2039	1575.632
2040	1633.041
2041	1589.52
2042	1667.308
2043	1464.735
2044	1687.769
2045	1648.483
2046	1674.971
2047	1563.325
2048	1814.472
2049	1720.181
2050	1694.892

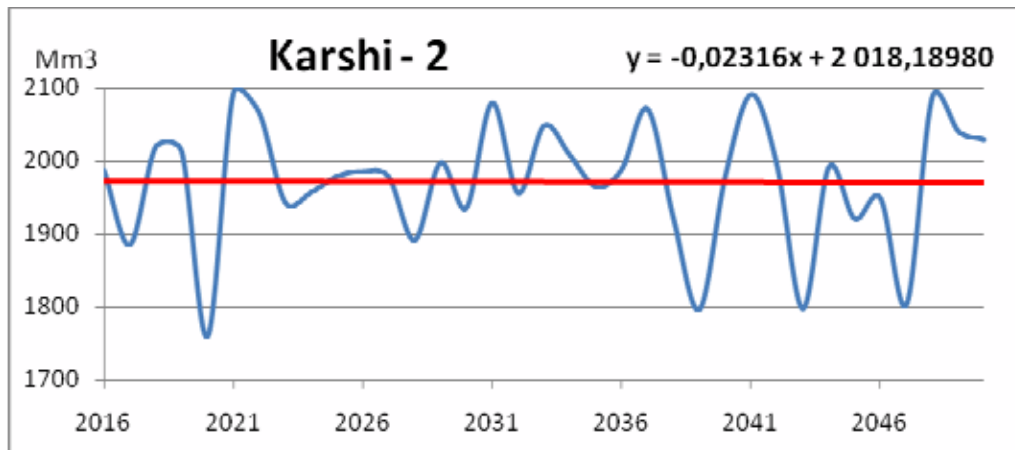
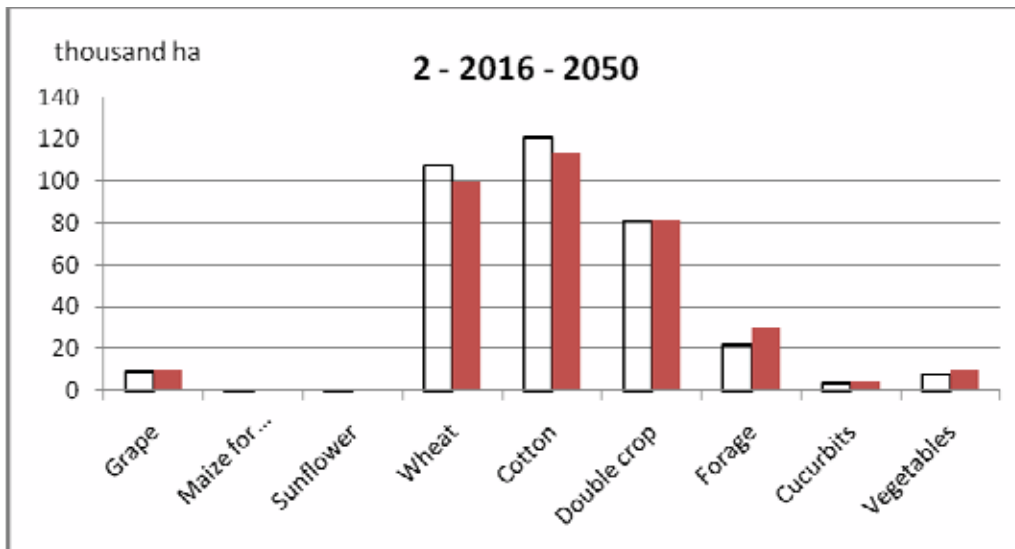


Crop area, ths ha

Year	Crop	Ths ha
2016	7	21.923
2016	11	0.32
2016	18	0.359
2016	20	90.557
2016	37	108.3
2016	200	45.1
2016	300	23.936
2016	301	1.88
2016	302	14.575
2050	7	42.4
2050	11	5.3
2050	18	5.3
2050	20	63.6
2050	37	68.9
2050	200	45.1
2050	300	31.8
2050	301	13.25
2050	302	39.75

Annual water delivery, Mm3

Year	Mm3
2016	1987.12085
2017	1884.3537
2018	2019.02828
2019	2013.00143
2020	1758.7093
2021	2092.35933
2022	2065.39233
2023	1942.69894
2024	1956.41726
2025	1978.15026
2026	1985.04551
2027	1977.44602
2028	1890.54174
2029	1996.95572
2030	1934.99263
2031	2079.3979
2032	1955.30464
2033	2047.77236
2034	2007.30171
2035	1964.46845
2036	1987.68792
2037	2070.74559
2038	1920.81707
2039	1795.58814
2040	1978.03088
2041	2090.75367
2042	1993.70222
2043	1796.89229
2044	1990.85033
2045	1919.9885
2046	1948.12205
2047	1802.42054
2048	2087.42947
2049	2040.0295
2050	2028.8747

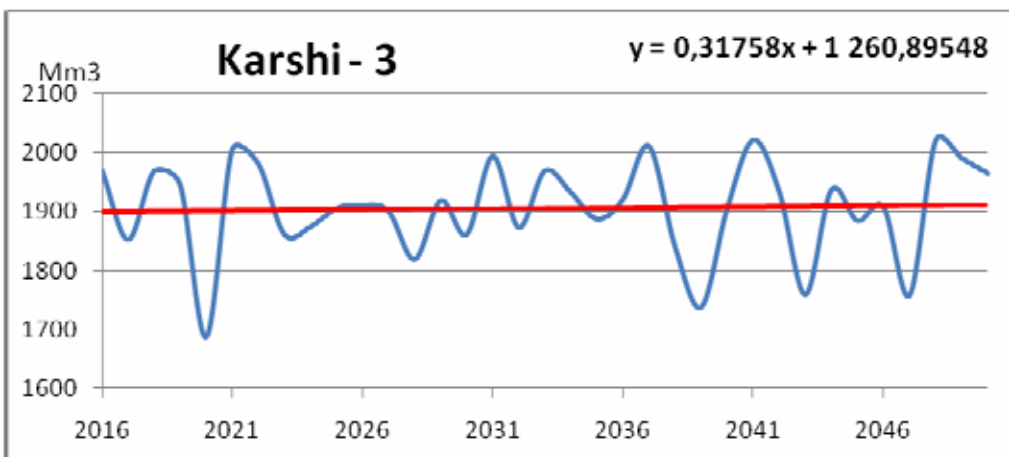
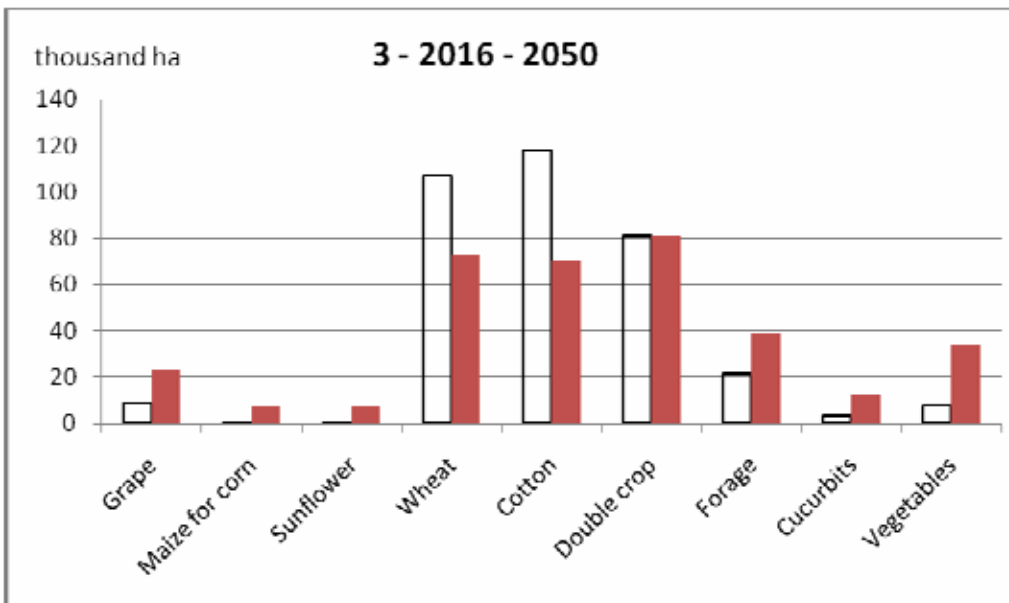


Crop area, ths ha

Year	Crop	Ths ha
2016	7	8.938371
2016	11	0.169359
2016	18	0.169359
2016	20	107.0679
2016	37	120.4211
2016	200	81.1
2016	300	21.92871
2016	301	3.324526
2016	302	7.473866
2050	7	10.31075
2050	11	0.064783
2050	18	0.064783
2050	20	100.1242
2050	37	113.3145
2050	200	81.1
2050	300	30.29462
2050	301	4.551376
2050	302	9.574206

Annual water delivery, Mm3

Year	Mm3
2016	1970.82997
2017	1852.61294
2018	1969.52964
2019	1946.24464
2020	1687.40835
2021	2005.66107
2022	1981.74066
2023	1861.62351
2024	1874.73601
2025	1906.04669
2026	1912.10255
2027	1901.29568
2028	1818.97499
2029	1919.28942
2030	1861.62707
2031	1994.68408
2032	1873.50892
2033	1969.86252
2034	1932.87051
2035	1888.04821
2036	1921.43186
2037	2011.62199
2038	1840.66704
2039	1737.82877
2040	1905.70318
2041	2022.05968
2042	1934.30312
2043	1759.28791
2044	1937.35246
2045	1885.14932
2046	1908.51027
2047	1758.11316
2048	2021.15418
2049	1991.22036
2050	1965.95152

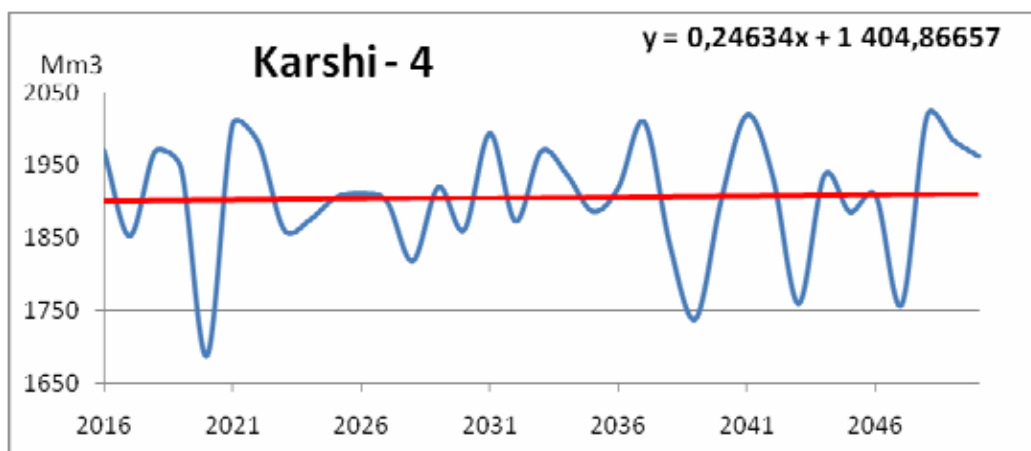
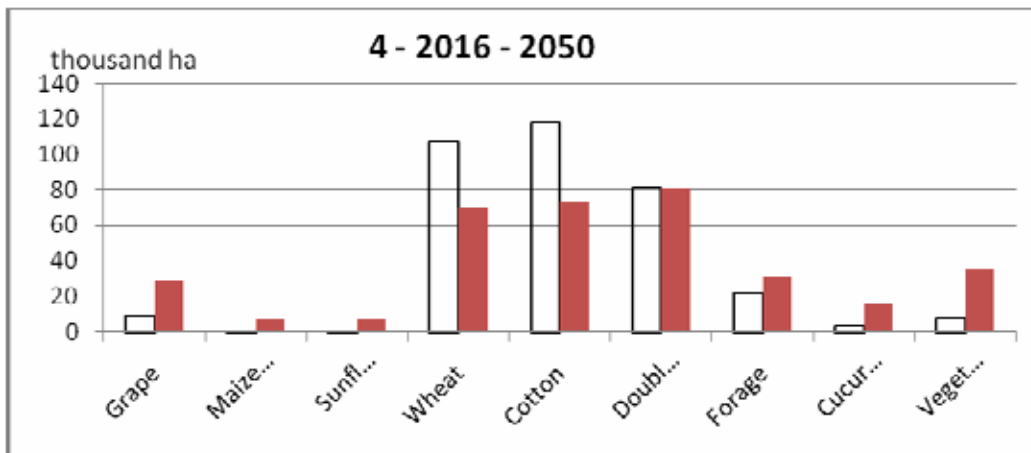


Crop area, ths ha

Year	Crop	Ths ha
2016	7	9.158466
2016	11	0.2096535
2016	18	0.2096535
2016	20	107.048
2016	37	118.243
2016	200	81.1
2016	300	21.79013
2016	301	3.307744
2016	302	7.921216
2050	7	23.454
2050	11	7.818
2050	18	7.818
2050	20	72.968
2050	37	70.362
2050	200	81.1
2050	300	39.09
2050	301	13.03
2050	302	33.878

Annual water delivery, Mm3

Year	Mm3
2016	1970.82997
2017	1852.61294
2018	1969.52964
2019	1946.24464
2020	1687.40835
2021	2005.54423
2022	1981.51833
2023	1861.31767
2024	1874.57734
2025	1905.42986
2026	1911.18997
2027	1900.11425
2028	1817.9225
2029	1919.75391
2030	1860.67876
2031	1993.46729
2032	1872.74622
2033	1969.08045
2034	1936.90814
2035	1886.43798
2036	1919.21624
2037	2009.45841
2038	1839.91124
2039	1738.58416
2040	1903.20194
2041	2019.04203
2042	1934.22938
2043	1759.51746
2044	1935.87868
2045	1885.60694
2046	1908.16265
2047	1757.64361
2048	2018.41405
2049	1984.45166
2050	1962.09465



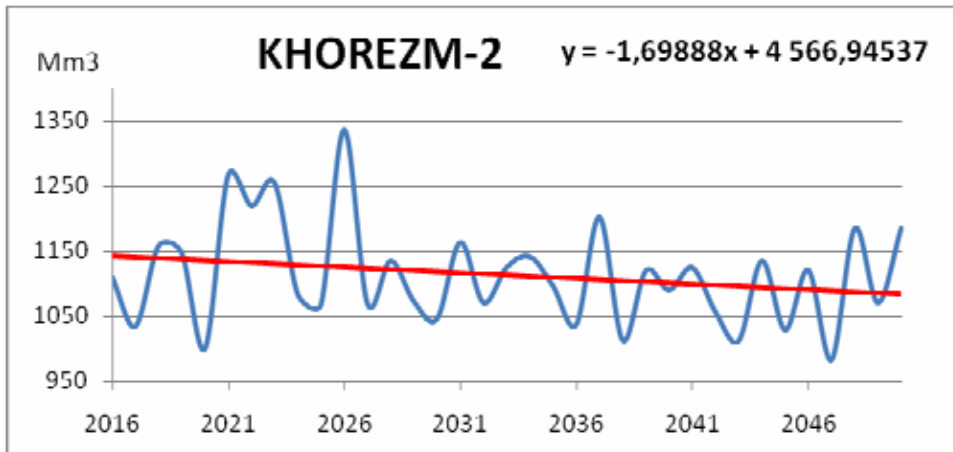
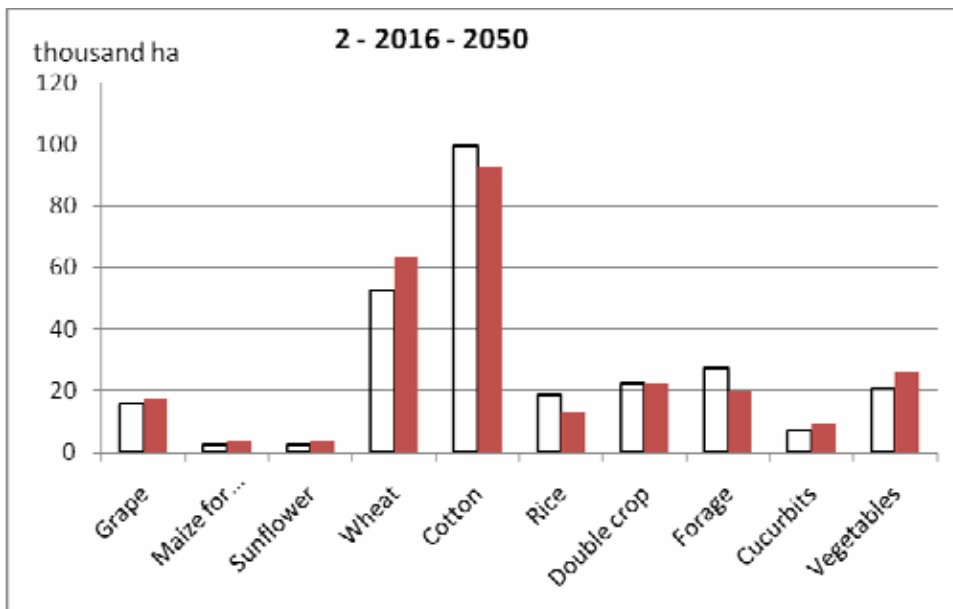
Crop area, ths ha

Year	Crop	Ths ha
2016	7	9.158466
2016	11	0.2096535
2016	18	0.2096535
2016	20	107.048
2016	37	118.243
2016	200	81.1
2016	300	21.79013
2016	301	3.307744
2016	302	7.921216
2050	7	28.677
2050	11	6.5175
2050	18	6.5175
2050	20	70.389
2050	37	72.996
2050	200	81.1
2050	300	31.284
2050	301	15.642
2050	302	35.1945

Khorezm and South Karakalpakstan PZs BAU

Annual water delivery, Mm3

Year	Mm3
2016	1110.2874
2017	1034.1684
2018	1157.8192
2019	1146.7442
2020	1000.0276
2021	1266.3476
2022	1219.1483
2023	1254.4079
2024	1083.4365
2025	1067.9946
2026	1336.1274
2027	1069.5493
2028	1135.1355
2029	1072.7877
2030	1045.7263
2031	1163.4695
2032	1070.8379
2033	1124.7886
2034	1141.3972
2035	1096.2187
2036	1036.9783
2037	1202.147
2038	1012.9065
2039	1119.9904
2040	1089.9205
2041	1124.6758
2042	1056.1432
2043	1012.1391
2044	1135.1789
2045	1028.6631
2046	1120.9659
2047	982.90533
2048	1184.9927
2049	1070.5353
2050	1184.5529



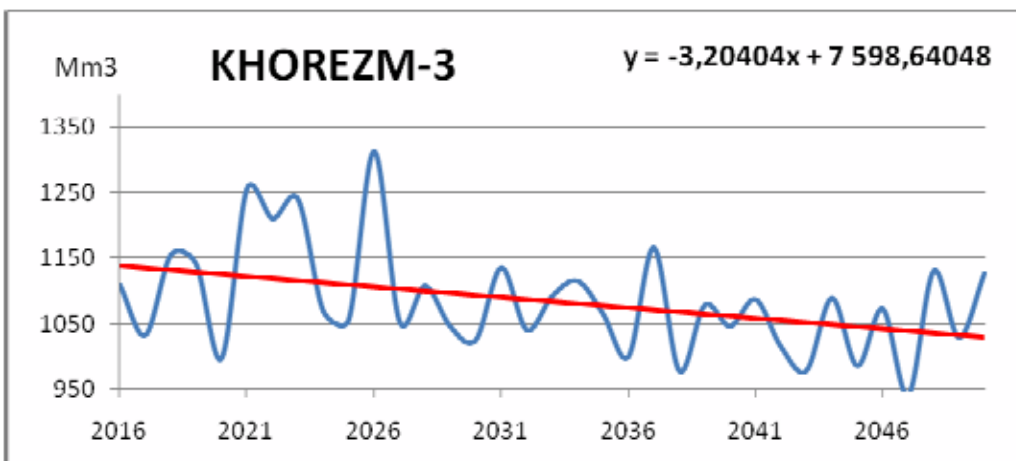
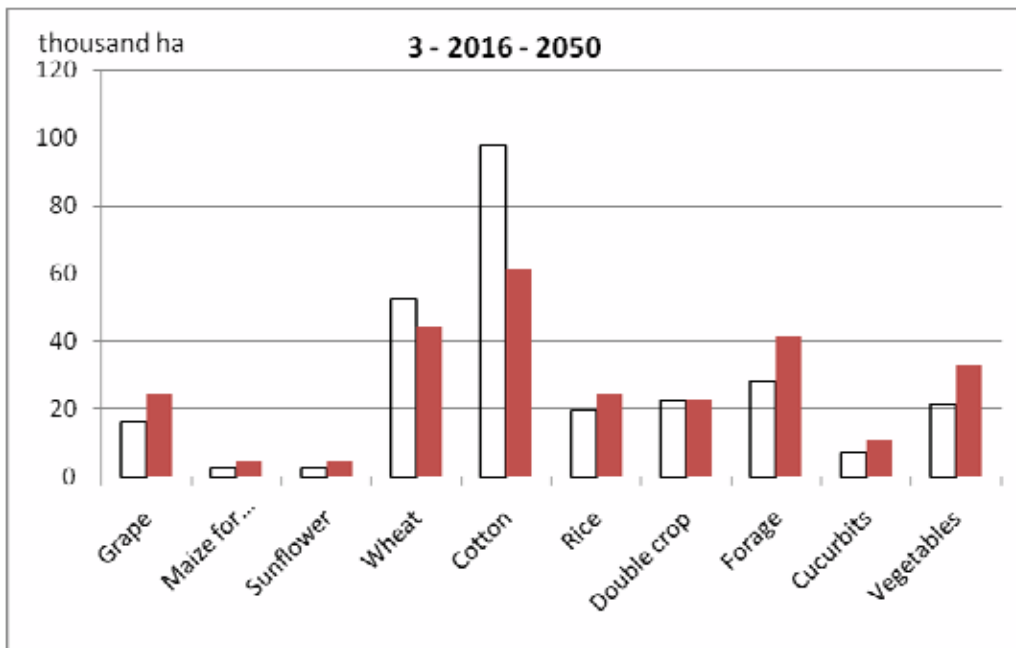
Crop area, ths ha

Year	Crop	Ths ha
2016	7	15.87516
2016	11	2.541237
2016	18	2.541237
2016	20	52.52978
2016	37	99.31284
2016	41	18.56966
2016	200	22.422
2016	300	27.49501
2016	301	7.020439
2016	302	20.80214
2050	7	17.37132
2050	11	3.604717
2050	18	3.604717
2050	20	63.2467
2050	37	92.43381
2050	41	13.08467
2050	200	22.422
2050	300	19.78715
2050	301	9.257682
2050	302	26.26815

Khorezm and South Karakalpakstan PZs FSD

Annual water delivery, Mm3

Year	Mm3
2016	1109.2395
2017	1031.9016
2018	1154.6208
2019	1140.9762
2020	996.69245
2021	1255.7979
2022	1209.9663
2023	1240.2908
2024	1068.7527
2025	1055.3142
2026	1312.5702
2027	1052.7836
2028	1107.2092
2029	1045.0505
2030	1024.9515
2031	1135.1909
2032	1040.3608
2033	1091.702
2034	1114.9272
2035	1064.7342
2036	999.27646
2037	1165.7388
2038	977.68381
2039	1077.7432
2040	1046.0691
2041	1086.5399
2042	1014.3175
2043	978.16836
2044	1088.7902
2045	985.22836
2046	1072.217
2047	939.66881
2048	1129.8805
2049	1028.5797
2050	1126.1469



Crop area, ths ha

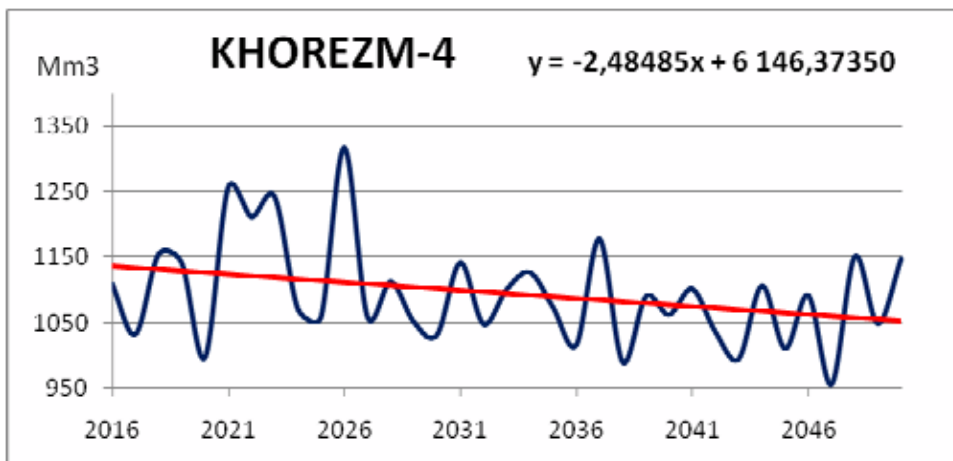
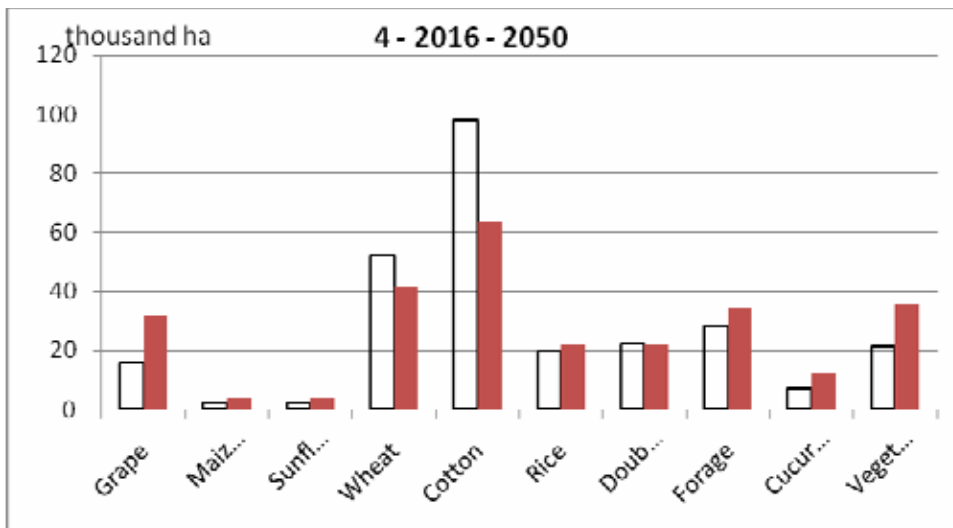
Year	Crop	Ths ha
2016	7	15.986
2016	11	2.559
2016	18	2.559
2016	20	52.335
2016	37	97.929
2016	41	19.474
2016	200	22.422
2016	300	28.413
2016	301	7.006
2016	302	21.594
2050	7	24.5
2050	11	4.9
2050	18	4.9
2050	20	44.1
2050	37	61.25
2050	41	24.5
2050	200	22.422
2050	300	41.65
2050	301	11.025
2050	302	33.075

Khorezm and South Karakalpakstan PZs ESA

Annual water delivery, Mm3

Mm3

Year	Mm3
2016	1109.2395
2017	1031.9016
2018	1154.6208
2019	1140.9762
2020	996.69245
2021	1256.5047
2022	1211.3865
2023	1242.4908
2024	1071.112
2025	1058.5193
2026	1317.0598
2027	1059.1111
2028	1112.7034
2029	1051.0668
2030	1031.2918
2031	1141.6195
2032	1048.0423
2033	1100.5183
2034	1126.6346
2035	1073.3972
2036	1015.8994
2037	1177.8644
2038	989.86485
2039	1089.8977
2040	1062.2661
2041	1101.5456
2042	1035.4492
2043	994.6041
2044	1106.4305
2045	1010.3218
2046	1091.8476
2047	955.66194
2048	1150.9411
2049	1048.5249
2050	1147.4681



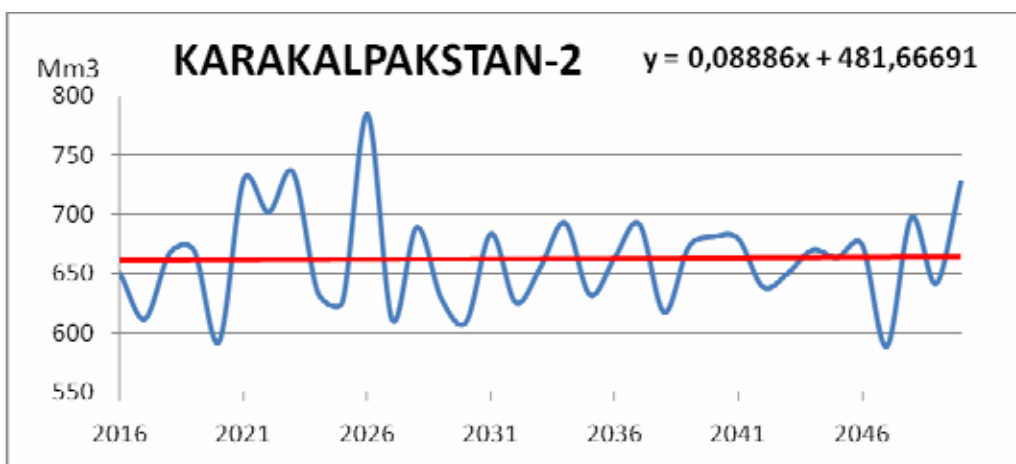
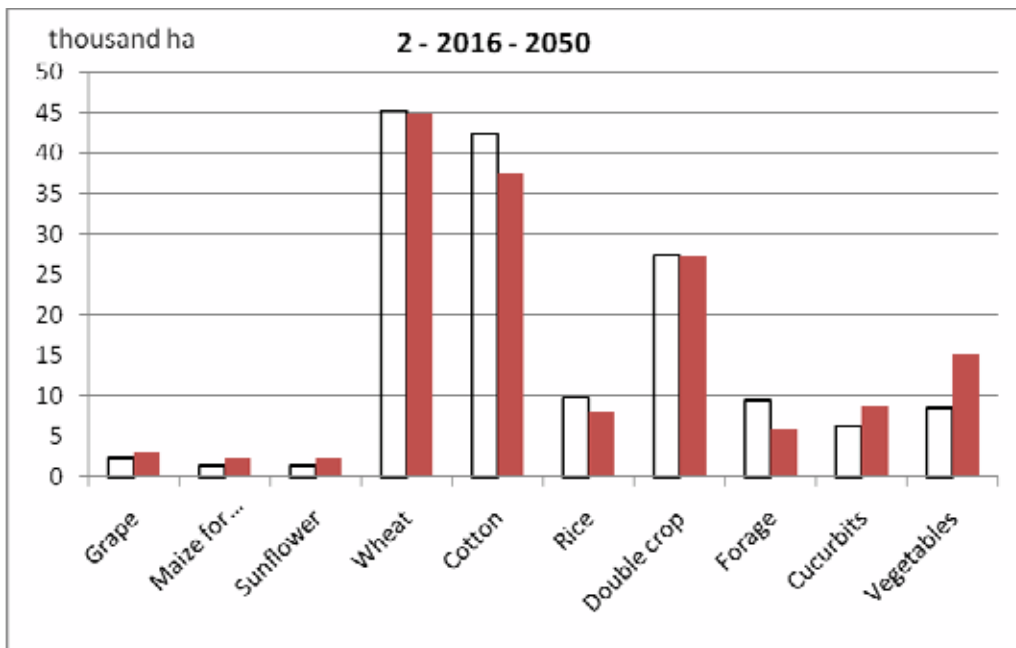
Crop area, ths ha

Year	Crop	Ths ha
2016	7	15.986
2016	11	2.559
2016	18	2.559
2016	20	52.335
2016	37	97.929
2016	41	19.474
2016	200	22.422
2016	300	28.413
2016	301	7.006
2016	302	21.594
2050	7	31.85
2050	11	3.675
2050	18	3.675
2050	20	41.65
2050	37	63.7
2050	41	22.05
2050	200	22.422
2050	300	34.3
2050	301	12.25
2050	302	35.525

North Karakalpakstan PZ BAU

Annual water delivery, Mm3

Year	Mm3
2016	650.162591
2017	611.3511743
2018	666.9250412
2019	669.2533326
2020	591.8541642
2021	729.4365617
2022	701.60868
2023	735.6027335
2024	633.5647908
2025	626.2360081
2026	784.8774507
2027	610.9745819
2028	689.1159852
2029	628.2217365
2030	608.8247627
2031	683.5108279
2032	625.3057293
2033	655.0686042
2034	692.7765693
2035	631.8176686
2036	663.1781309
2037	691.681812
2038	617.0197001
2039	672.6436106
2040	680.901868
2041	679.2782887
2042	638.3939913
2043	650.1124968
2044	669.85388
2045	663.3388602
2046	674.5561848
2047	588.1008186
2048	697.2693779
2049	641.3253447
2050	727.2441175



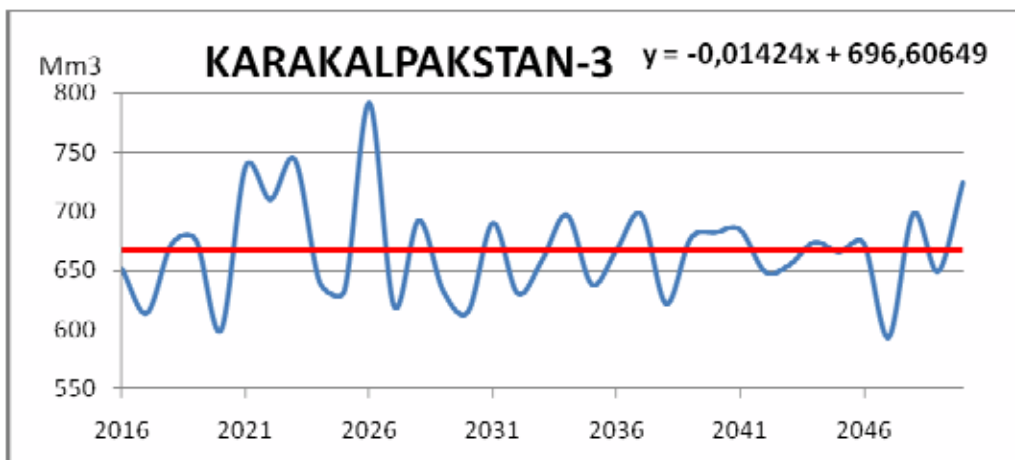
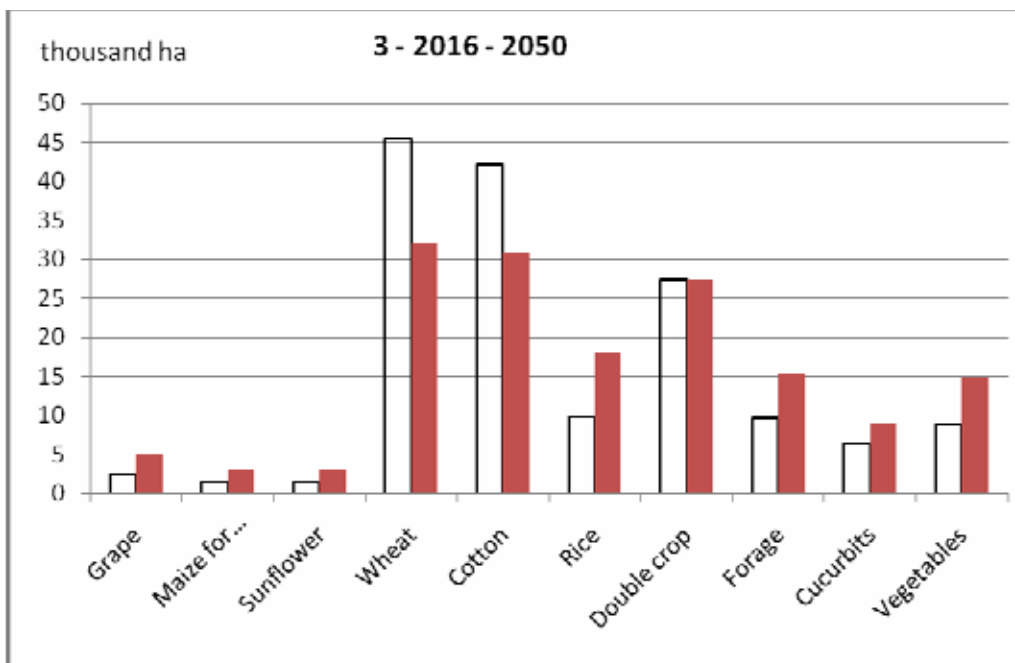
Crop area, ths ha

Year	Crop	Ths ha
2016	7	2.397444
2016	11	1.433361
2016	18	1.433361
2016	20	45.32054
2016	37	42.495
2016	41	9.792251
2016	200	27.42174
2016	300	9.446331
2016	301	6.287213
2016	302	8.584273
2050	7	3.210659
2050	11	2.332538
2050	18	2.332538
2050	20	44.8081
2050	37	37.56392
2050	41	7.979345
2050	200	27.42174
2050	300	5.930437
2050	301	8.678703
2050	302	15.22325

North Karakalpakstan PZ FSD

Annual water delivery

Year	Mm3
2016	651.8048929
2017	614.1951773
2018	672.3446087
2019	675.8118247
2020	599.5317356
2021	738.303268
2022	710.332847
2023	743.9912446
2024	640.1479083
2025	633.3932797
2026	792.0048881
2027	620.5201077
2028	692.7767918
2029	632.5646195
2030	615.6126013
2031	690.4974197
2032	630.9827248
2033	659.5832986
2034	697.3242768
2035	638.6653288
2036	667.7866207
2037	697.8767838
2038	622.2673976
2039	677.754256
2040	682.4589218
2041	684.8325746
2042	649.3648251
2043	655.3291344
2044	674.3548605
2045	665.9071289
2046	673.0601414
2047	593.8036747
2048	698.6280933
2049	649.4730602
2050	724.4448297



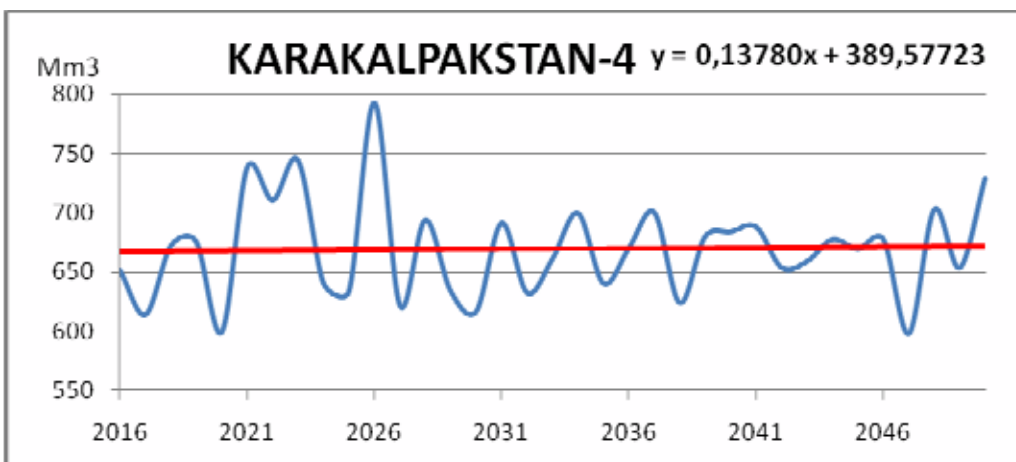
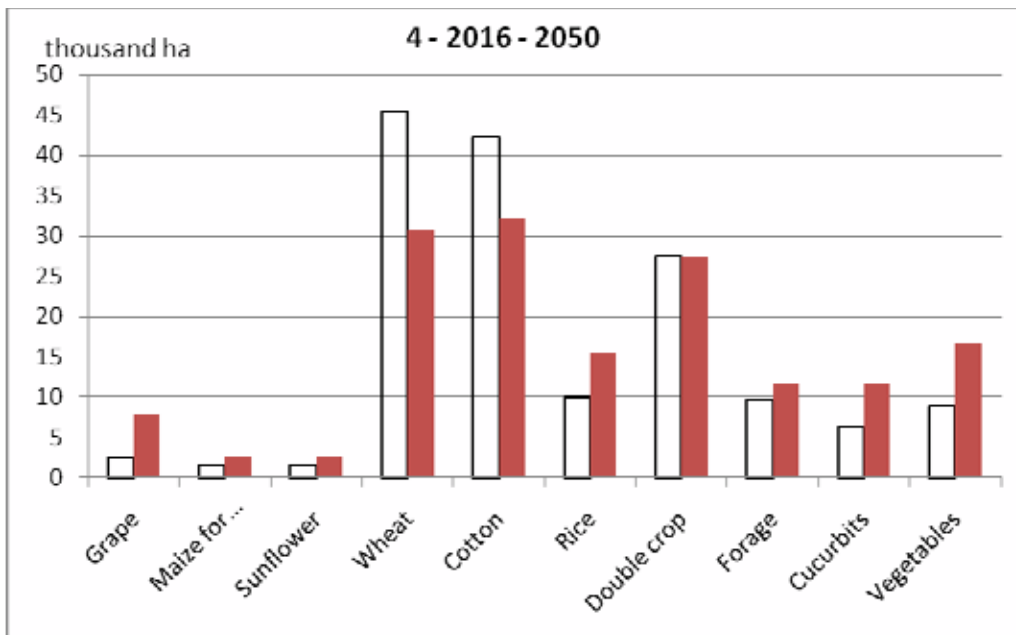
Crop area, ths ha

Year	Crop	Ths ha
2016	7	2.437552
2016	11	1.494232
2016	18	1.494232
2016	20	45.36523
2016	37	42.22688
2016	41	9.948938
2016	200	27.42174
2016	300	9.71791
2016	301	6.397054
2016	302	8.840678
2050	7	5.148
2050	11	3.2175
2050	18	3.2175
2050	20	32.175
2050	37	30.888
2050	41	18.018
2050	200	27.42174
2050	300	15.444
2050	301	9.009
2050	302	14.8005

North Karakalpakstan PZ ESA

Annual water delivery, Mm3

year	Mm3
2016	651.8048929
2017	614.1951773
2018	672.3446087
2019	675.8118247
2020	599.5317356
2021	738.4503732
2022	710.6857688
2023	744.4738673
2024	640.6202587
2025	634.1316734
2026	792.9564853
2027	622.2105184
2028	694.2126703
2029	634.0048
2030	617.059478
2031	691.6493485
2032	632.7602556
2033	661.4998646
2034	700.0367361
2035	640.5765155
2036	670.4436307
2037	700.5163557
2038	624.1837183
2039	680.3949455
2040	684.3283874
2041	688.3404877
2042	654.0120828
2043	659.3195015
2044	677.8966654
2045	669.6134317
2046	677.8805762
2047	598.2891734
2048	702.9948501
2049	653.8099219
2050	729.4118774



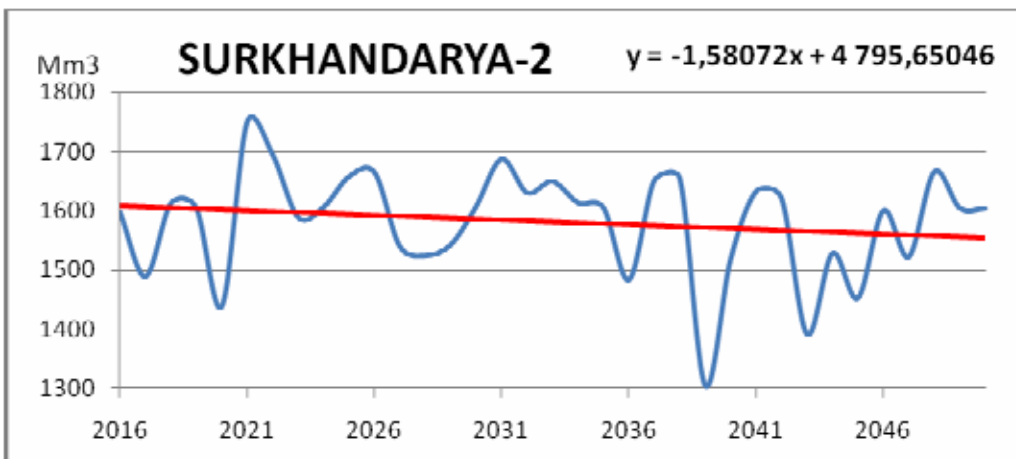
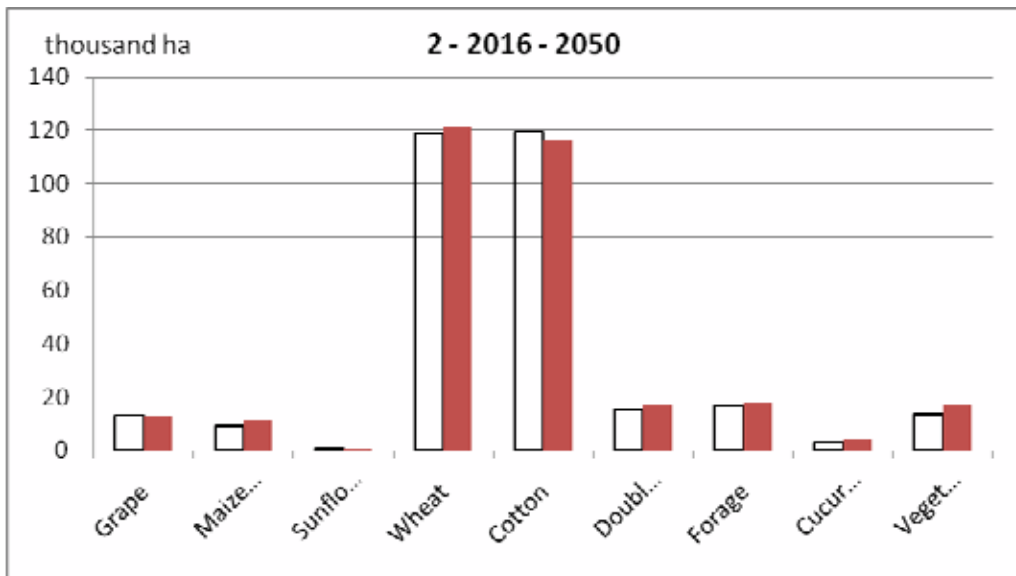
Crop area, ths ha

Year	Crop	Ths ha
2016	7	2.437552
2016	11	1.494232
2016	18	1.494232
2016	20	45.36523
2016	37	42.22688
2016	41	9.948938
2016	200	27.42174
2016	300	9.71791
2016	301	6.397054
2016	302	8.840678
2050	7	7.722
2050	11	2.574
2050	18	2.574
2050	20	30.888
2050	37	32.175
2050	41	15.444
2050	200	27.42174
2050	300	11.583
2050	301	11.583
2050	302	16.731

Surkhandarya PZ BAU

Annual water delivery, Mm3

Year	Mm3
2016	1598.943114
2017	1489.680855
2018	1613.240044
2019	1605.934711
2020	1438.891493
2021	1750.911413
2022	1695.778002
2023	1590.0094
2024	1607.118181
2025	1658.462996
2026	1666.017284
2027	1540.396465
2028	1524.980228
2029	1543.642472
2030	1608.605503
2031	1688.122805
2032	1631.305487
2033	1650.388018
2034	1614.373943
2035	1606.242544
2036	1484.034176
2037	1652.272795
2038	1655.63565
2039	1305.876483
2040	1519.23069
2041	1633.719423
2042	1622.131646
2043	1392.429868
2044	1529.218956
2045	1453.322069
2046	1601.157057
2047	1523.011115
2048	1666.737996
2049	1605.597721
2050	1604.487837



Crop area, ths ha

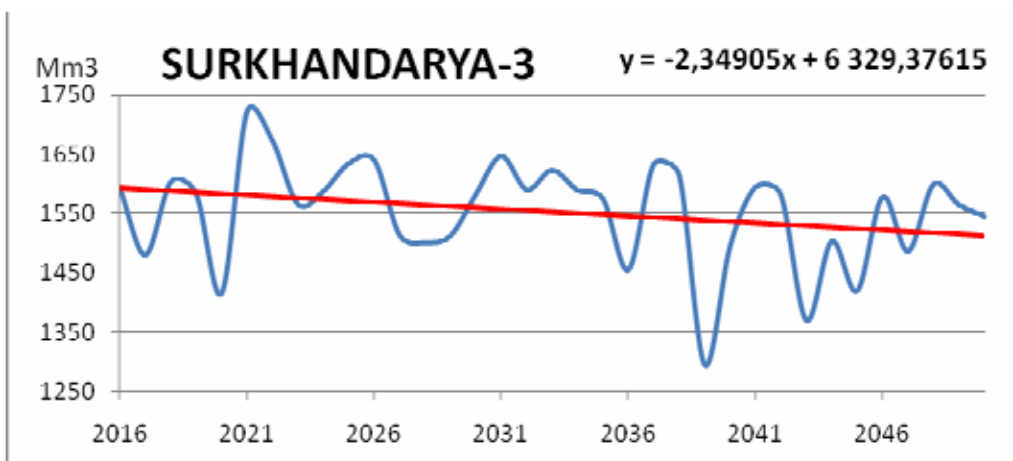
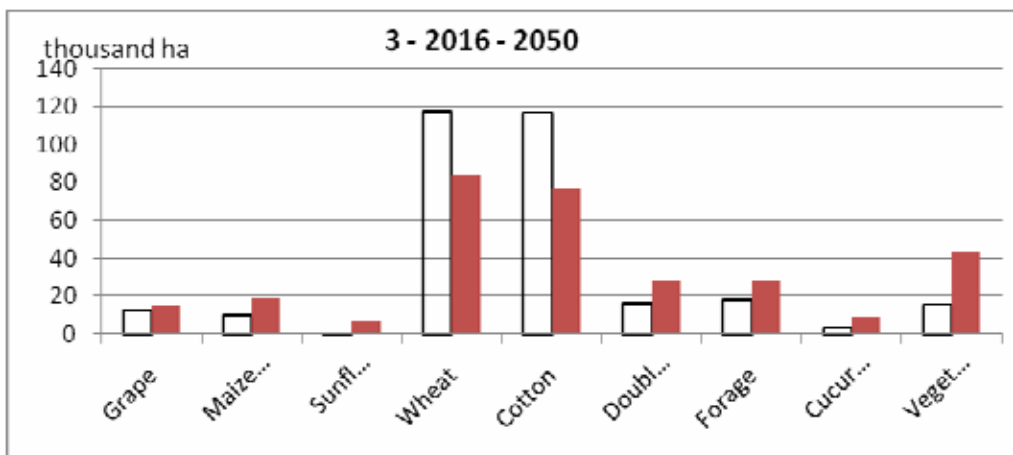
Year	Crop	Ths ha
2016	7	12.85318
2016	10	9.199103
2016	11	0.26553
2016	20	118.762
2016	37	119.3481
2016	51	15.56893
2016	300	16.91803
2016	301	3.156577
2016	302	13.52096
2050	7	12.93026
2050	10	11.53546
2050	11	0.051775
2050	20	121.392
2050	37	116.0525
2050	51	17.23833
2050	300	18.02677
2050	301	4.091552
2050	302	17.04005

Surkhandarya PZ FSD

Annual water delivery, Mm3

Mm3

Year	Mm3
2016	1593.270961
2017	1480.440258
2018	1603.64933
2019	1584.132546
2020	1415.590766
2021	1722.138166
2022	1673.270472
2023	1566.080399
2024	1587.806953
2025	1634.742597
2026	1640.748019
2027	1514.030196
2028	1501.532399
2029	1512.825377
2030	1582.784077
2031	1647.177821
2032	1590.59618
2033	1623.579864
2034	1589.618319
2035	1575.239073
2036	1455.523153
2037	1634.076442
2038	1615.098022
2039	1295.759998
2040	1494.967572
2041	1595.157331
2042	1582.24122
2043	1370.23256
2044	1503.8131
2045	1419.985612
2046	1578.323266
2047	1486.565103
2048	1599.190499
2049	1565.164629
2050	1545.894274



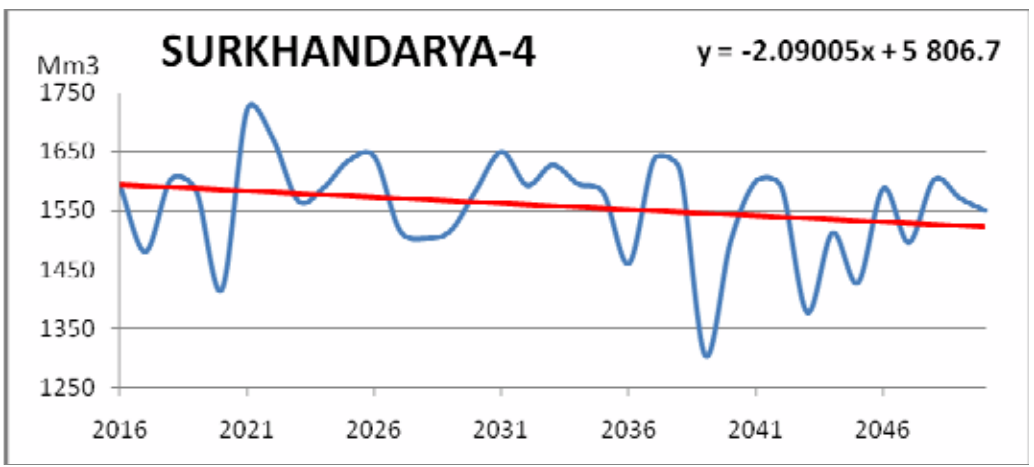
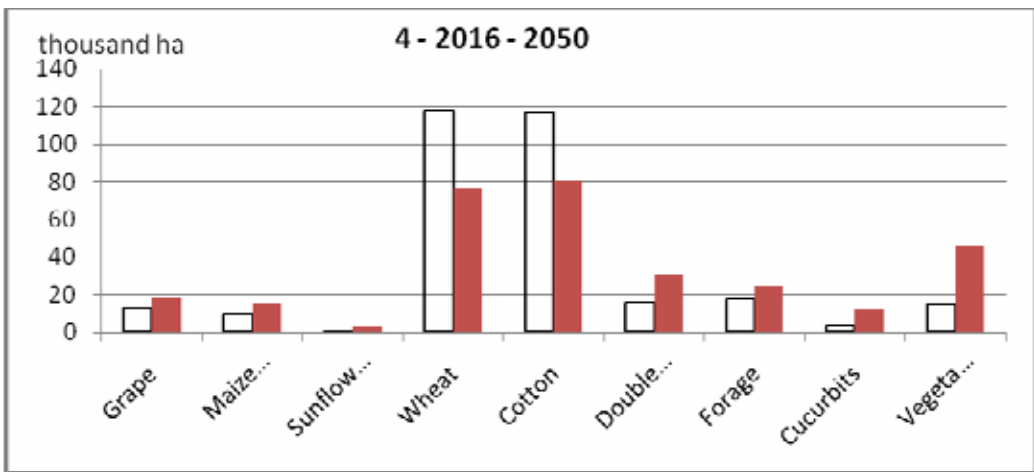
Crop area, ths ha

Year	Crop	Ths ha
2016	7	12.744
2016	10	9.712001
2016	11	0.312
2016	20	117.522
2016	37	116.765
2016	51	15.887
2016	300	18.03
2016	301	3.184
2016	302	15.062
2050	7	15.415
2050	10	18.498
2050	11	6.166
2050	20	83.241
2050	37	77.075
2050	51	27.747
2050	300	27.747
2050	301	9.249
2050	302	43.162

Surkhandarya PZ ESA

Annual water delivery, Mm3

year	Mm3
2016	1593.270961
2017	1480.440258
2018	1603.64933
2019	1584.132546
2020	1415.590766
2021	1722.435953
2022	1673.901982
2023	1567.114898
2024	1589.174079
2025	1636.023075
2026	1642.304224
2027	1516.282007
2028	1503.128104
2029	1516.42988
2030	1585.525749
2031	1650.441562
2032	1593.383506
2033	1628.037014
2034	1595.719154
2035	1580.67297
2036	1460.172121
2037	1638.8166
2038	1620.558195
2039	1303.792027
2040	1498.093086
2041	1600.82533
2042	1590.174681
2043	1377.620503
2044	1512.57185
2045	1427.579875
2046	1588.164952
2047	1496.02757
2048	1603.271796
2049	1571.865579
2050	1550.494627



Crop area, ths ha

Year	Crop	Ths ha
2016	7	12.744
2016	10	9.712001
2016	11	0.312
2016	20	117.522
2016	37	116.765
2016	51	15.887
2016	300	18.03
2016	301	3.184
2016	302	15.062
2050	7	18.498
2050	10	15.415
2050	11	3.083
2050	20	77.075
2050	37	80.158
2050	51	30.83
2050	300	24.664
2050	301	12.332
2050	302	46.245

