SUPPLEMENTARY MATERIAL

The Container Inhabiting Mosquito Simulation (CIMSiM) (Focks et al. 1993) is the entomological life-table simulation model that provides mosquito populations for the Dengue Simulation (DENSiM) (Focks et al. 1995). Meteorological observations are used by the simulation to calculate water levels in mosquito larval habitats, to calculate growth rates, and physiological status of mosquitoes. These calculations in turn determine biting rates. In DENSiM, the mosquito population interacts with the human population to simulate virus transmission. Again, meteorological observations influence virus transmission by determining the extrinsic incubation period of virus in the mosquitoes. In these ways, the influence of climate (through meteorological observations) on dengue transmission can be assessed.

For the sake of record, the mosquito breeding habitat parameters used in CIMSiM are provided here (Table S1). These parameters were determined from a previous study (Williams et al. 2008) in which mosquito productivity and water levels were field validated. These parameters are entered into the CIMSiM model and interact with meteorological observations to produce mosquitoes. A number of previous studies have utilised CIMSiM and DENSiM to study mosquito populations (e.g. Williams et al. 2010, Rasic et al. 2014) and dengue transmission dynamics (Bannister-Tyrrell et al. 2013, Williams et al. 2015).

# Table S1. CIMSiM model parameters for mosquito breeding habitats used in simulations.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Buckets | Pot plant saucers | Tarpaulins | Tyres | Subterranean | Rainwater tanks |
| Dimensions (cm) | 18.0 d, 17.4 h | 6.1 x 2.0 x 26.0 cm | 15.5 x 22.6 x 4.2 cm | 35.3 d, 11.0 w | 64.6 x 72.7 x 172.0 | 200 d x 200 h |
| Capacity | 4.87 L | 0.61 L | 0.52 L | 5.3 L | 807.8 L | 6,284.0 L |
| Sun exposure | 0.2 | 0 | 0.8 | 0.3 | 0.9 | 0.5 |
| Container cover | 0 | 1 | 0 | 1 | 1 | 1 |
| Water shed ratio | 1.2 | 0 | 0.6 | 0.2 | 10 | 10 |
| Draw down (L) | 0 | 0.3 | 0 | 0 | 0 | 628.4 |
| Initial food (mg) | 70 | 100 | 450 | 500 | 144.75 | 50 |
| Food per d (mg) | 30 | 10 | 175 | 100 | 144.75 | 50 |
| density per ha. | 2.2 | 3.9 | 1.1 | 0.53 | 0.1 | 0.1 |

**Table S2. Summary data for current and future climate (MPI ECHAM5 model, A2 carbon emissions scenario). SD = standard deviation.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Location | Years | Max Temp | Ave Temp | Min Temp | Rainfall | RH | Sat Deficit |
| **Brisbane** | 2046-2065 | 26.4, SD 3.78 | 21.42, SD 3.88 | 16.44, SD 4.47 | 3.27, SD 12.08 | 70.04, SD 9.77 | 7.53, SD 2.79 |
|  | 1990-2012 | 26.26, SD 3.96 | 20.97, SD 4.13 | 15.65, SD 4.99 | 2.71, SD 10.03 | 67.27, SD 12.02 | 8.01, 3.23 |
| **Future change** | **+0.14** | **+0.45** | **+0.79** | **+0.56** | **+2.77** | **-0.48** |
| **Cairns** | 2046-2065 | 29.45, SD 2.8 | 25.7, SD 2.47 | 21.95, SD 2.57 | 6.22, SD 20.31 | 76.6, SD 7.41 | 7.49, SD 2.34 |
|  | 1990-2012 | 29.27, SD 2.54 | 25.11, SD 2.64 | 20.95, SD 3.23 | 5.5, SD 18.91 | 73.76, SD 8.92 | 8.14, SD 2.74 |
| **Future change** | **+ 0.18** | **+0.59** | **+1** | **+0.72** | **+2.84** | **-0.65** |
| **Rockhampton** | 2046-2065 | 28.29, SD 3.77 | 23.47,SD 3.94 | 18.65, SD 4.61 | 2.10, SD 7.54 | 72.65, SD 10.31 | 7.71, SD 3.04 |
|  | 1990-2012 | 28.75, SD 4.11 | 22.97, SD 4.3 | 17.14, SD 5.22 | 1.99, SD 8.63 | 66.78, SD 11.16 | 9.22, SD 3.56 |
| **Future change** | **-0.46** | **+0.5** | **+1.51** | **+0.11** | **+5.87** | **-1.51** |
| **Townsville** | 2046-2065 | 29.05,SD 2.91 | 25.03,SD 3.02 | 21.01, SD 3.48 | 2.62, SD 14.05 | 75.41,SD 8.73 | 7.56, SD 2.63 |
|  | 1990-2012 | 29.26, SD 2.81 | 24.69, SD 3.56 | 20.07, SD 4.73 | 3.19, SD 15.65 | 69.87, SD 10.64 | 9.15, SD 3.25 |
| **Future change** | **-0.21** | **+0.34** | **+0.94** | **-0.57** | **+5.54** | **-1.59** |

**Table S2. Summary data for current and future climate (MPI ECHAM5 model, B1 carbon emissions scenario). SD = standard deviation.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Location | Years | Max Temp | Ave Temp | Min Temp | Rainfall | RH | Sat Deficit |
| **Brisbane** | 2046-2065 | 26.59, SD 3.71 | 21.67, SD 3.89 | 16.76, SD 4.59 | 2.88, SD 10.36 | 70.14, SD 9.69 | 7.63, SD 2.83 |
|  | 1990-2012 | 26.26, SD 3.96 | 20.97, SD 4.13 | 15.65, SD 4.99 | 2.71, SD 10.03 | 67.27, SD 12.02 | 8.01, 3.23 |
| **Future change** | **+0.33** | **+0.7** | **+1.11** | **+0.17** | **+2.87** | **-0.38** |
| **Cairns** | 2046-2065 | 29.51, SD 2.76 | 25.71, SD 2.47 | 21.9, SD 2.63 | 6.91, SD 19.43 | 76.62, SD 7.34 | 7.48, SD 2.32 |
|  | 1990-2012 | 29.27, SD 2.54 | 25.11, SD 2.64 | 20.95, SD 3.23 | 5.5, SD 18.91 | 73.76, SD 8.92 | 8.14, SD 2.74 |
| **Future change** | **+0.24** | **+0.6** | **+0.95** | **+1.41** | **+2.86** | **-0.66** |
| **Rockhampton** | 2046-2065 | 29.04, SD 3.75 | 23.85, SD 3.94 | 18.65, SD 4.68 | 1.91, SD 6.93 | 73.52, SD 10.33 | 7.64, SD 3.08 |
|  | 1990-2012 | 28.75, SD 4.11 | 22.97, SD 4.3 | 17.14, SD 5.22 | 1.99, SD 8.63 | 66.78, SD 11.16 | 9.22, SD 3.56 |
| **Future change** | **+0.29** | **+0.88** | **+1.51** | **-0.08** | **+6.74** | **-1.58** |
| **Townsville** | 2046-2065 | 29.64, SD 2.84 | 25.51, SD 3.03 | 21.37, SD 3.57 | 2.42, SD 12.16 | 75.33, SD 8.73 | 7.8, SD 2.7 |
|  | 1990-2012 | 29.26, SD 2.81 | 24.69, SD 3.56 | 20.07, SD 4.73 | 3.19, SD 15.65 | 69.87, SD 10.64 | 9.15, SD 3.25 |
| **Future change** | **+0.38** | **+0.82** | **+1.3** | **-0.77** | **+5.46** | **-1.35** |