**List of Tables**

1. Brief description of meteorological stations used in this study
2. Brief description of hydrological stations used in this study
3. Categorization of flood hazard index
4. Calibration parameters with their ranges
5. Statistical performance measures used for discharge calibration and validation in 1D-hydrodynamic modeling
6. Statistical performance measures used for water level calibration and validation in 1D-hydrodynamic modeling
7. Categorization of flood hazards against different return periods
8. Flood adaptation and capacities assessment at different administration level

**Tables**

**Table 1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Stations | Code | Latitude | Longitude | Elevation(masl) | Source |
| Chiang Mai | 07013 | 18o50'23" N | 98o58'32" E | 304.5 | TMD |
| Doi Saket | 07052 | 18o52'08" N | 99o08'22" E | 320 | TMD |
| San Pa Tong | 07082 | 18o37'37" N | 98o53'56" E | 315 | TMD |
| Phrao | 07122 | 07o12'21" N | 100o35'56" E | 440 | TMD |
| Chiang Dao | 07132 | 19o21'53" N | 98o57'60" E | 390 | TMD |
| Samoeng | 07142 | 18o50'52" N | 98o44'09" E | 530 | TMD |
| Mae Chaem | 07152 | 18o29'54" N | 98o21'54" E | 480 | TMD |
| Omkoi | 07162 | 17o47'45" N | 98o21'36" E | 820 | TMD |
| Chom Thong | 07182 | 18o24'57" N | 98o40'47" E | 280 | TMD |
| Sop Prap | 16042 | 17o52'45" N | 99o20'26" E | 195 | TMD |
| Thoen | 16072 | 17o36'39" N | 99o13'08" E | 160 | TMD |
| Mae Phrik | 16082 | 17o26'49" N | 99o07'04" E | 170 | TMD |
| Muang | 17012 | 18o34'38" N | 99o00'34" E | 290 | TMD |
| Mae Tha | 17042 | 18o27'35" N | 99o08'14" E | 337 | TMD |
| Ban Hong | 17052 | 18o18'52" N | 98o49'21" E | 310 | TMD |
| Ban Tak | 63022 | 17o02'46" N | 99o04'34" E | 125 | TMD |
| Sam Ngao | 63062 | 17o14'32" N | 99o01'28" E | 150 | TMD |

TMD: Thai Meteorological Department

**Table 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Stations | Code | Latitude | Longitude | Source |
| Nawarat Bridge | P.1 | 18o47'09" N | 99o00'29" E | RID |
| Ban Mae Tae | P.67 | 19o01'11" N | 98o57'42" E | RID |

RID: Royal Irrigation Department

**Table 3**

|  |  |  |  |
| --- | --- | --- | --- |
| Flood depth (m) | Flood hazard category | Description | HI |
| D < 0.80 | Low | “Low danger zone: flood level equal to floor level of residential houses, school buildings, and community centers” | 1 |
| 0.80 – 1.00 | Medium | “Danger zone: chances of flooding into low-lying residential houses, school buildings, and community centers” | 2 |
| 1.00 – 3.50 | High | “High danger zone: flooding would occur at low-lying areas and probability of extensive damages to property and infrastructure” | 3 |
| D > 3.50 | Very High | “Extreme danger zone: the single-storey building would be under threat and maximum damages to property and infrastructure” | 4 |

**Table 4**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Description | Unit | Parameter range | Modeled value |
| Umax | Maximum water content in surface storage | mm | 5-35 | 14.68 |
| Lmax | Maximum water content in root zone storage | mm | 50-400 | 89.99 |
| CQOF | Overland flow runoff coefficient | - | 0-1 | 0.59 |
| CKIF | Time constant for routing interflow | hrs | 200-2000 | 380.78 |
| CK1,2 | Time constant for routing overland flow | hrs | 3-73 | 36.49 |
| TOF | Root zone threshold value for overland flow | - | 0-0.9 | 0.23 |
| TIF | Root zone threshold value for interflow | - | 0-0.9 | 0.08 |
| TG | Root zone threshold value for groundwater (GW) recharge | - | 0-0.9 | 0.21 |
| CKBF | Time constant for routing base flow Lower base flow/recharge to lower reservoir | hrs | 500-5000 | 1493.89 |
| Cqlow | Root zone threshold value for GW recharge | - | 0-100 | 21.38 |
| Cklow | Time constant for routing baseflow | hrs | 1000-30000 | 12528.50 |

**Table 5**

|  |  |  |
| --- | --- | --- |
|  | Station name | Statistical parameter |
|  | R | NSE | RMSE (m3/s) |
| Calibration | P.1 | 0.66 | 0.43 | 36.22 |
| P.67 | 0.70 | 0.46 | 26.91 |
| Validation | P.1 | 0.86 | 0.61 | 52.31 |
| P.67 | 0.87 | 0.56 | 50.56 |

**Table 6**

|  |  |  |
| --- | --- | --- |
|  | Station name | Statistical parameter |
|  | R | RPE | VB |
| Calibration | P.1 | 0.760 | -0.104 | -0.001 |
| P.67 | 0.080 | 0.289 | 0.002 |
| Validation | P.1 | 0.870 | 0.020 | -0.001 |
| P.67 | 0.362 | 0.430 | -0.001 |

**Table 7**

|  |  |  |
| --- | --- | --- |
| Return Period (years) | Total area of flooding (km2) | Hazard category |
| Low hazard area (km2) | Medium hazard area (km2) | High hazard area (km2) | Very high hazard area (km2) |
|   |
| 2 | 601.8 | 126.5 | 35.9 | 338.3 | 101.1 |
| 5 | 743.0 | 129.5 | 49.6 | 394.2 | 169.7 |
| 10 | 811.4 | 137.2 | 38.4 | 426.6 | 209.2 |
| 25 | 878.3 | 134.2 | 37.3 | 397.3 | 309.5 |
| 50 | 935.6 | 137.0 | 37.2 | 399.0 | 362.4 |
| 100 | 996.9 | 137.6 | 36.6 | 382.9 | 439.8 |

**Table 8**

|  |  |  |  |
| --- | --- | --- | --- |
| Adaptation Level | Flood Mitigation Strategies | Institutional Organizations | Adaptive Capacity of each Administration Level |
| National Government Level | 1) Water resource management in the upstream area2) Flood early warning dissemination | 1) Hydrology and water management center(HWMC) under royal irrigation department2) Department of disaster prevention andmitigation (DDPM) under ministry of interior | 1) Institutions and governance risk assessment2) Monitoring and warningsknowledge3) Education and information4) Climate change adaptation technology |
| Local Government Level | 1) Flood mitigation measures2) Local early warning dissemination3) Assistance/relief to affected residents | 1) Local city municipality 2) Sub-districtadministration organization (SAO)3) Provincial public health office | 1) Economic resources2) Institutions and networking3) Knowledge and skills4) Technology5) Infrastructure |
| Community Level | 1) Building of dikes using sandbag 2) Dredging of drains  | Not Applicable  | 1) Local human resources2) Community economic resources |