This manuscript develops a socio-hydrological model to simulate the cooperation dynamics of flood control and hydropower in Columbia River Basin on basis of Columbia River Treaty (CRT) signed between the United States and Canada. Overall, it's an interesting study within the scope of socio-hydrology and transboundary rivers, and the proposed model has potential application value in other basins. However, I have some concerns and suggestions, which needs to be addressed. Below are detailed comments:

Major concerns

1. It's unjustified that the authors linearly aggregated the reservoirs for flood control and hydropower production. Flood control and hydropower production not only depend on reservoirs operation rules, but also related to the hydrological connections between reservoirs. The aggregated reservoirs may be applicable for the total storage, but will be bound to bring risks on flood control and hydropower production.
2. The flood damage is typically estimated based on the peak daily water flow in a year. However, I notice the proposed model in study conducted with a monthly time step, which indicates that the peak daily water flow have been smoothed. The flood damage will be thereby remarkably underestimated, significantly challenging current results.

Minor concerns

1. How to distinguish the positive and negative feedbacks between variables in Figure 2?
2. I am puzzled about equation (3) and (4):

(1) The simplified reservoir operation rule indicated by equation (3) and (4) is used to determine the outflow, which is considered as vital factor in the model. It's suggested to cite corresponding references and add justification description for these equations.

(2) It's worth noting that n_{CA} is an important parameter for outflow of Canada. What's the explicit connotation of n_{CA} and how to determine it?

(3) The outflow is dominated by storage thresholds (i.e., $S_{CAthreshold}$ and $S_{USthreshold}$). The storage threshold is always between the target flood control storage ($S_{FCthreshold}$) and target hydropower storage ($S_{HPthreshold}$) as shown in Figure 3, as storage threshold is estimated by linearly aggregating $S_{FCthreshold}$ and $S_{HPthreshold}$ in equations (5) and (6), which is prone to simultaneously increase flood damage and decrease hydropower production. Please give more justification description.

3. Please check whether the second 'C_{CA}' is a typo in equation (6).

4. The motivation of applying logit dynamics functions to simulate the cooperation probability variables C_{CA} and C_{CA} should be detailed in line 378.

5. It's unjustified to determine the hydropower without considering water head in equation (20), despite that the simulated series can fit the observed series well. Moreover, the threshold water flow is directly selected as 400 m^3/s, which needs more description.

6. It's suggested to add another section in Methodology to describe the feedback loops on basis of the dynamic equations in Section 3.2.

7. In line 677, how to determine whether the stability is achieved?

8. In Figure 7(b), the trajectories of probability to cooperate perform notable periodicity, which needs to be well accounted.